



FRIDAY, OCTOBER 25, 1895.

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Contributions.

Long-Lived Rails.

NEW YORK, Oct. 15, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The communication in your issue of Oct. 11 regarding the Quincy Railroad, and the editorial comment thereon, bring to mind the fact that the rail had not entirely disappeared from the track of the Raleigh & Gaston Railroad as late as 1877, and probably could have given good service to a much later date. This rail was of English make, and had been in the track for a number of years.

W. BRYAN.

[The Southern States furnish a good deal of our ancient history. Since New England has become so saturated with the fast Western spirit, our only true conservatives are to be found down there. It is less than two years since we heard of strap rails still in service on the Columbia branch of the Southwestern Railroad of Georgia, a derailment due to a "snake-head" having occurred near Ducker, Ga., in January, 1894.—EDITOR RAILROAD GAZETTE.]

The Quincy Railroad of 1828.

PHILADELPHIA, Oct. 15, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reply to the criticism of Mr. George W. Blodgett, in regard to the Quincy Railroad, published in your issue of Oct. 11, I wish to say, that the road being very short and used only for a special local purpose, little notice has been taken of it beyond the fact of its being one of the earliest railroads constructed in America. While it has been frequently mentioned to that extent, the only description of the manner of its construction that I have been able to find is the following taken from "Appleton's New American Encyclopedia," vol. 13, page 728:

"The road was built upon granite sleepers $7\frac{1}{2}$ ft. long, laid 8 ft. apart. The rails 5 ft. apart were of pine 1 ft. deep, covered with an oak plate, and this with flat bars of iron."

As the Quincy Railroad was constructed in 1826 and 1827, before my attention was drawn to the subject of railroads, I cannot speak from personal observation. If Mr. Blodgett can furnish any more reliable information than what has been above stated, I will cheerfully stand corrected.

W. HASELL WILSON.

The Philadelphia & Columbia Track.

18 BROADWAY, NEW YORK, Oct. 12, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You are quite correct regarding the Philadelphia & Columbia track. The granite sills with the iron plates were in use as late as 1857, and probably until 1870, on the portion of the line that extended through Broad street, Philadelphia. Of course long before that period the Philadelphia & Columbia had ceased to exist, and the Philadelphia & Reading Railroad had succeeded to its location as far out as the Columbia bridge over the Schuylkill, but the track on Broad street continued to be used, chiefly for coal cars, drawn by mules.

During my college days this track was an object lesson. Later, while engaged on the original surveys to establish Fairmount Park, I came across the remains of the inclined plane by which the ascent was made from the Columbia bridge to the summit which is now called Belmont. It consisted of granite blocks, about 3 ft. long and 12 in. square, set endwise in the ground about 8 ft. apart center to center; these were inclined so as to be normal to the slope. Cast iron "edge rails" with lugs on the ends for feet were used for the plane. The rails were secured to the granite blocks by fastenings lead-

or wedged into holes drilled into the stone but I failed to find any specimens and do not know precisely what was used. These old blocks were afterwards broken up for road material and used for making drives.

FOSTER CROWELL.

American Railway Association.

The Fall meeting of this Association was held in New York, Oct. 16 and 17. There were 75 delegates present, representing 67 companies. November 17 is the date that was adopted for the Fall change of time-tables. President Haynes addressed the Association on the subject of "Railroad Organization," and his address was reported in the *Railroad Gazette* of Oct. 18.

The Executive Committee reported that the membership of the Association now consists of 221 companies, operating 143,154 miles of road. Also several amendments to the rules of order. Cincinnati was selected as the place for the next meeting of the Association.

The revision of the Rules for the Movement of Trains by Telegraphic Orders was adopted. The Committee on Car Service had issued a circular on the question of the adoption of the rate of 15 cents a day for the use of interchanged freight cars, and replies had been received from 154 roads, as follows:

Affirmative, 77 roads, owning and controlling 490,271 cars.

Negative, 77 roads, owning and controlling 394,669 cars. It required roads representing about 832,500 cars to put the proposed rate in effect.

The rates per mile for passenger cars interchanged were amended to read as follows:

"For coaches, chair cars, or combination passenger cars, 3 cents; for postal cars, 2 cents; for baggage and express cars, or combination baggage, express and mail cars, $1\frac{1}{2}$ cents." These rates are to apply where the owner of the cars participates in the business, and not where cars are hired to other lines. The resolution concerning per diem rates was amended to read as follows:

"That the Association recommends that the per diem for passenger coaches, chair cars, or combination passenger cars, hired at other than mileage rates, be fixed at five dollars a day, and for baggage, mail cars, or combination baggage, express and mail cars at three dollars a day, subject, however, to agreement between the parties interested."

It was resolved that the maximum excess allowed over the marked capacity of freight cars shall not exceed 10 per cent. of such marked capacity. The Committee on Safety Appliances and the Committee on General Regulations for Employees reported progress. Resolutions were unanimously adopted in appreciation of the kindly treatment received by the representatives of the Association at the London Congress with expression of the hope that the time may come when it will be possible to reciprocate. A copy of these resolutions is to be forwarded to the officers of the English Section, Sir Andrew Fairbairn and Mr. W. M. Acworth, to whom special thanks are due, with the request that they will also convey an expression of these sentiments to those gentlemen who acted as hosts upon many pleasant occasions.

The joint committee on interlocking and block signals made a report which was discussed all day and then recommitted.

The following resolution was adopted by the Association:

"WHEREAS, It will be impossible to have all cars returned in time for each railroad to comply with the law requiring all cars to be equipped with handholds or grab irons and drawbars of a certain height; therefore

"Resolved, That it is the sense of this Association that after the law takes effect each railroad equip all cars belonging to any railroad company with handholds or grab irons and raise drawbars to proper height to comply with the law, that may be on their respective roads at that time and bill against the owners of said cars at the prices agreed upon by the Master Car Builders' Association."

It was resolved that the Association recommends that railroad companies issue instructions prohibiting shippers from mutilating and defacing cars by nailing, pasting or otherwise placing advertisements or placards of any kind upon freight cars.

Roadmasters' Convention.

The thirteenth annual meeting of the Roadmasters' Association of America was held at the Southern Hotel, St. Louis, Oct. 15, 16 and 17. President Robert Black was called away and the chair was occupied by Mr. Jones (C. B. & Q.), Vice-President. An address of welcome was delivered by Mayor Walbridge. After the election of 22 new members and the usual preliminaries the first business was the nomination of new officers, as follows: President, C. E. Jones (C. B. & Q.), Beardstown, Ill.; First Vice-President, J. E. Kerwin (C. & N. W.); Second Vice-President, F. R. Doty (Ill. Central); Secretary and Treasurer, J. B. Dickson (C. & N. W.); Sterling, Ill. All of these were subsequently elected. The Committee on Joint Fastenings, J. W. Wright, Chairman, made a report which, with the other reports, was published in the *Railroad Gazette* last week, page 685. The samples mentioned in the report did not arrive in time to be shown at the meeting.

The report after being read was discussed at length.

Mr. Dickson is using truss joints on 72-lb. rails on a steep grade. They have been down five years and make an excellent track.

Mr. A. Rockwell (M. K. & T.) has in use 200 miles of the "Continuous" rail joint. Not one in a thousand has broken, and what few have failed have shown defects in material. With ordinary angle joints the cost of maintenance of track on his road is \$27.50 a mile monthly. With the continuous joint it is only \$17.50, a saving of \$10 per mile per month. This has been the record for about two years. The cost of the continuous joint for 75-lb. rails is \$1.20; for 66-lb. rails it is \$1.17.

Mr. J. L. Single (L. I. R. R.), has "continuous" joints and angle bars on opposite rails of the same track, and finds that maintenance costs about 16 per cent. less where the continuous joint is used. This is where 200 trains traverse the track every 24 hours.

Mr. J. T. Fisher (M. K. & T.) has 117 miles of 60-lb. rails fitted with continuous joints which have given perfect satisfaction. Mr. C. H. Blue (I. C.) uses the Weber joint on 75-lb. rails. The nuts have not been tightened since the joints were put down, and there is no trouble from shrinking of the wood. This joint costs \$1.25.

Inquiry being made as to experience with common angle bars, Mr. C. F. Mitchell (C. & St. P.) said that with 24-in. bars he had much trouble, but 40-in. bars gave satisfaction. The report was received as information and the subject continued for the next meeting.

The report of the Committee on Hollow Tires was next read. Considerable discussion followed as to whether the roadmasters were not demanding too much in asking that locomotive driving wheel tires be turned off as soon as they were worn $\frac{1}{8}$ in. Mr. John Doyle (C. & W. M.) held that accidents from bad tires were generally caused by those worn as much as $\frac{1}{8}$ in. a degree of wear which must be attributed to lack of care. The speaker thought that if every roadmaster carried a gage and tested tires, reporting bad ones to headquarters, the managers would cure the evil. There was a proposition to make the limit $\frac{1}{8}$ in. for high speed engines and $\frac{1}{4}$ in. for those running at moderate speeds, but it failed and the report was finally adopted after being made to recommend that "the wear of tires be not allowed to exceed $\frac{1}{4}$ in. on all engines, and that driving wheel brake shoes be used on all engines that will wear off that portion of the tires which is not worn by the rails."

On Wednesday the meeting began at 9:30 a. m. Mr. W. F. Ellis referred to the recent fast runs on the New York Central and praised the track of that company. Next came a discussion on long rails and miter joints.

Mr. Morrison (Lehigh Valley) explained that the temporary disuse of miter-end rails on his road was due to a difficulty in rolling the rails and not to any dissatisfaction with the miter end. The company expects to resume the use of such rails and to have them cut at least 45 ft. long. The roadmasters like long rails so well that they hope the company will make them 60 ft. The speaker deemed miter sawing the only suitable way of dealing with long rails, as with square ends the contraction in cold weather makes too large a space. With the diagonal opening the wheel is never without support. These rails had not broken except from defects of manufacture such as are found in other kinds of rails. On double track rails ought to be laid so that the miter would make a trailing point on both sides; this is not done on the Lehigh Valley, and yet there has been no trouble or even suspicion of danger. All rails on that road are laid broken joint. Miter joints have been used to some extent since 1884. Mr. Morrison then went on to describe his way of handling long rails, as set forth on a paper by him which is printed in another column of this issue. After considerable discussion, a motion was adopted that the Association recommend the use of rails from 45 to 60 ft. long.

This was followed by a short discussion on weekly reports from foremen, and this by an address from Mr. C. F. Street, who told of what he had seen in his journey around the world during the past year.

At the afternoon session there was a report on the preservation of ties by Mr. J. Lahey (C. & N. P.), but it did not discuss chemical processes. The report holds that no two contiguous old ties should be taken out at the same time. By distributing the new among the old the life of the latter is prolonged. Of the 18 ties under a 30-ft. rail two should generally be removed at the end of eight years, three the next year, four the next, four the next, three the next, and two in the last or 13th year. With stone ballast and second growth white oak ties this can be done, even with heavy traffic. Another report was read by Mr. Collom (L. S. & M. S.), which dealt chiefly with the best methods of handling ties. Stripping the bark off as soon as the ties are cut aids seasoning and prevents the wood from souring. Ties should be piled crosswise, two in a tier one way and eight the other. They should be distributed as near the time of laying as possible and be kept out of ditches, so that they will not get water soaked if allowed to lie a few days. Ties should not be dragged into place by picks; the dozen holes thus made often damage the tie considerably. Tie tongs should be used or else the ties be put in place by hand. Hardwood plugs should always be used to fill old spike holes. These reports were accepted.

On Thursday the report of the Committee on Standard Track Tools was read by Mr. C. Heckler (Ill. Central). After considerable discussion the track gage was recommitted. It was voted that the lining bar ought not to weigh over 20 lbs., and ought to have a chisel point, and that the track level should be $3\frac{1}{2}$ in. high in the middle instead of 3 in., as recommended by the committee. The other standards recommended, as stated in our report of last week, were adopted. Drawings, copied from those in the committee's report, showing the stand-

valves. This is one of the most novel locomotives built in this country for a long time. It will be used in the heaviest class of Western passenger service, and is expected to make an average speed of about 57 miles an hour. The Chicago & Northwestern has received from the Schenectady Locomotive Works a number of eight-wheeled passenger locomotives for very fast, hard service, in which the weight of the running gear is very much reduced by the use of cast steel, after the plan followed by the Boston & Albany. These engines have the common form of boiler, with a firebox about 8 ft. long, which gives a comparatively small grate area. The firebox is fitted with 3-in. tubes on which the fire brick

is to be compared with the others just mentioned. Following are its general dimensions:

Gage, standard	4 ft. 8 1/2 in.
Fuel, Anthracite coal	
Driving wheels, diameter	88 in.
Truck	33 in.
Tender	33 in.
Engine Truck	Swing Bolster
Journals, driving axles	8 1/2 in. x 11 in.
" truck	5 1/2 in. x 9 in.
" tender	4 1/4 in. x 8 in.
Wheel base, driving	7 ft. 9 in.
" truck	6 ft. 2 in.
" total engine	22 ft. 7 1/2 in.
" tender	15 ft. 11 in.
" engine and tender	49 ft. 10 in.
Center of truck pin to center of leading driving axle	141 1/2 in.
Weight in working order on drivers	90,000 lbs.

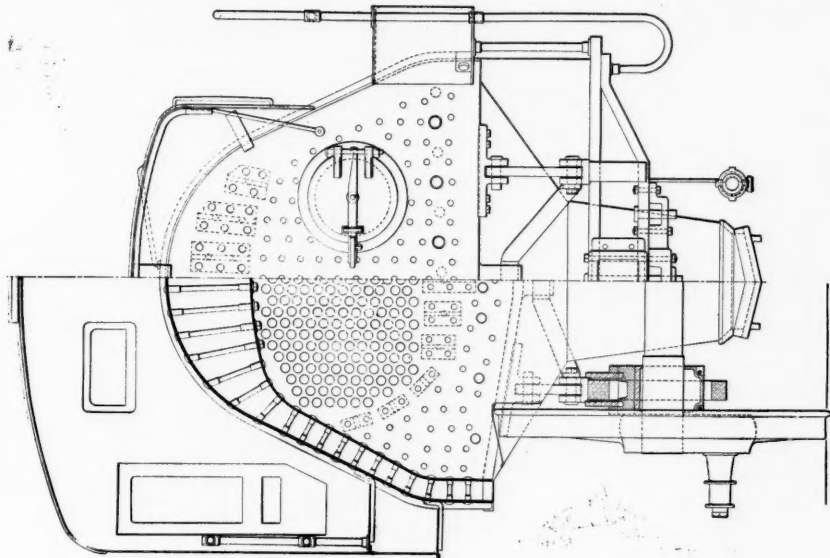


Fig. 4—Half Cross-Section through Firebox and Half Rear Elevation.

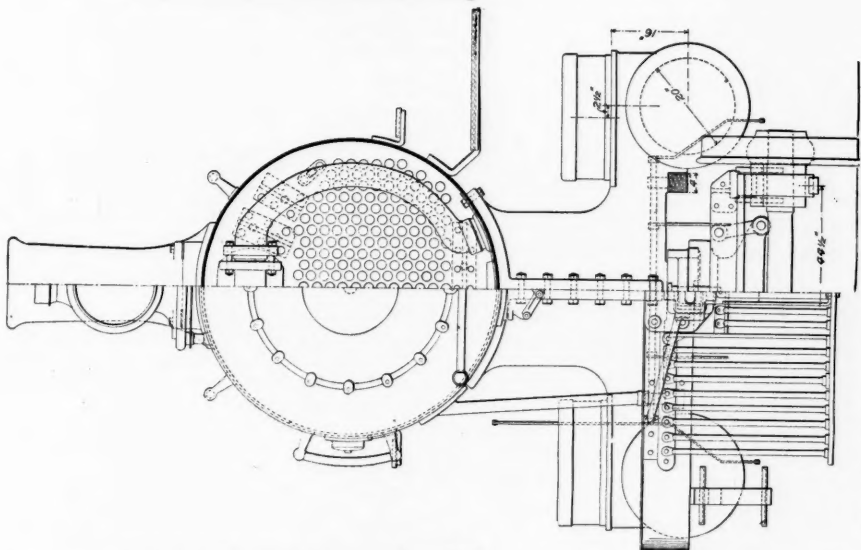


Fig. 3—Half Front Elevation and Half Cross-Section through Smokebox.
Transverse Views of Lehigh Valley Passenger Locomotive.

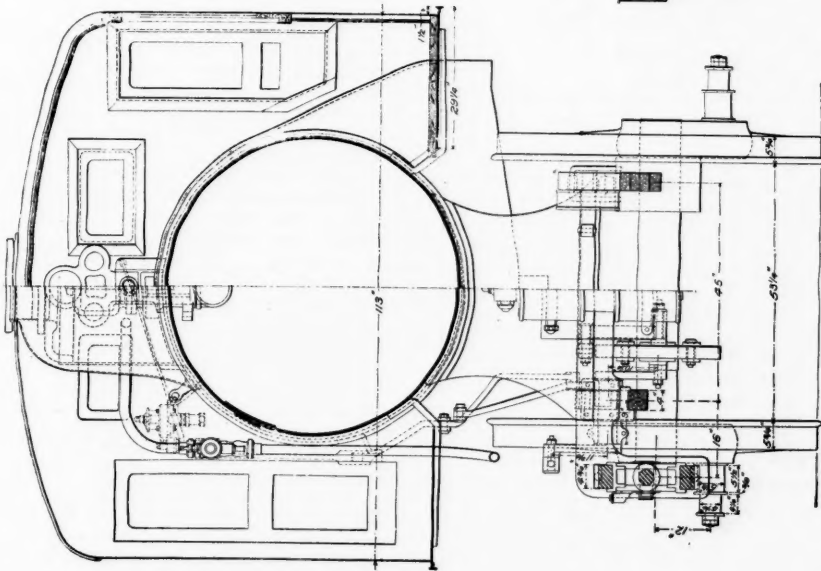


Fig. 2—Half Cross-Section in Front of Dome Looking Backward, and Half Cross-Section through Cab Looking Backward.

arches are placed. The Pennsylvania Railroad has built a new fast passenger locomotive, not unlike the class "P" in general form, but with a larger boiler and improvements in details. The dimensions of this locomotive have not been published. The Baldwin Locomotive Works have built for the Philadelphia & Reading a locomotive with a large Wootten firebox and a single pair of drivers. This locomotive carries 200 lbs. steam pressure, has Vaucain compound cylinders, and is probably the most economical locomotive in America, judging from the results obtained in actual service. Up to this time no scientific test has been made of this engine.

The engine here shown belongs to the new order, and

Weight on truck wheels	38,500 lbs.
" of engine, total	124,500 lbs.
" tender	84,000 lbs.
" engine and tender, loaded	212,500 lbs.
" tender empty	36,420 lbs.
" coal (full load)	16,000 lbs.
" water (full tank)	33,280 lbs.
Cylinders, diameter	20 in.
Stroke	24 in.
Distance, center to center of cylinders	77 in.
Piston rod, diameter	3 1/4 in.
Form of crosshead and guides	2 bar.
Valve gear, type	Stephenson
Ports, length, steam	17 in.
" width, exhaust	1 1/2 in.
Slide valves, lap, outside	3 in.
Maximum travel of valves	5 1/4 in.
Lead of valves	1 1/2 in.

Boiler, type	Straight
Diameter of barrel inside	59 1/4 in.
Thickness of barrel plates	3/8 in.
" smokebox tube plate	1/2 in.
Height from rail to center line	136 1/4 in.
Length of smokebox, including extension front end	61 in.
Working steam pressure	160 lbs.
Firebox, type	Wide
" length inside	119 in.
" width	82 in.
" depth at front	50 3/4 in.
" back	47 1/2 in.
thickness of side plates	3/8 in.
" back	1/2 in.
" crown sheet	3/8 in.
" grate area, square feet	67.7
staybolts, diameter	1 in.
" pitch	4 in.
Water space width, front, sides and back	3 in.
Tubes, material	Iron
" number	248
" pitch	2 3/4 in.
" diameter inside	1 7/8 in.
" outside	2 in.
lengthwise between tube sheets	13 ft. 6 1/4 in.
Total fire area of tube openings, sq. ft.	9.58
Heating surface, ratio to grate area	28 to 1
Ratio of exterior tube area to firebox heating surface	11.2 to 1
Heating surface, tubes, exterior, sq. ft.	1,758
" interior	1,547
" firebox	157
" total, with exterior tube area, sq. ft.	1,915
Heating surface, total, with interior tube area, sq. ft.	1,704
Exhaust nozzle (double) diameter	3 1/4 in.
Smokestack, smallest diameter	11 in.
Capacity of tank	4,000 gals.
" coal space	8 tons
Brake fittings	Am. O. S. eq. sized.
Tractive force per pound effective pressure on both pistons	141.2 lbs.
Total tractive force with effective pressure = 8-10 boiler pressure	17,074 lbs.
Total adhesion tractive power at 1/4 of weight on drivers	22,750 lbs.

These locomotives were built by the Baldwin Locomotive Works. The driving boxes are offset, in order to duplicate other locomotives on the Lehigh Valley road. The boilers have quadruple riveted butt joints. The domes are riveted to a base plate (as shown by Fig. 1), which is attached to the boiler, so that neither the dome nor the top sheet is flanged. All staybolts are drilled with 1/2-in. holes, 1 in. deep from the outer end, for a tell-tale. The eight center longitudinal rows of crown stays have hexagon nuts on the lower end for security. The steam valves are Richardson balanced. United States metallic packing is used on the piston and valve rods. The guides are of hammered iron, casehardened. Connecting and parallel rods are of steel. Crank pins are of steel, and the eccentric straps are of phosphor-bronze. The wheel centers are of cast-iron, with Latrobe tires. The driving axles are of steel. The cabs are of steel, lined with wood, with a ventilator in the roof. The pilots are of iron, with the Gould pilot coupler. The Leach sanding device is used for the drivers. The Gould tender coupler is used for the back draw-head. The trucks are of Fox pressed steel, with the plate 1/2-in. thick, fitted with National Hollow brake-beams. The springs are guaranteed to make 50,000 miles. All bolts are turned taper 1/8 in. to the foot, which is the Lehigh Valley standard. The brakes are American, with Ross steel shoes. The air pump is the 9 1/2-in. Westinghouse.

The material for these locomotives is inspected according to the Lehigh Valley standard material specifications. In every detail care has been taken to make these locomotives durable and substantial, and the fittings that have been selected are among the most economical that a railroad can buy.

The elevation shows some peculiarities in construction that are interesting. The details are well shown in Figs. 1, 2, 3 and 4. The smokebox design, Fig. 5, is very successful, and the spark arrester is probably the simplest form in use of the barrel type.

The tender used with these locomotives is the same as that illustrated in the *Railroad Gazette*, June 14, for the 10-wheelers on this road. One important feature of the 10-wheel engines designed by Mr. Higgins is the duplication of the parts with the company's 8-wheel engines so far as possible. In fact, the 10-wheelers are practically the same as the 8-wheelers, with another pair of drivers added.

Bridge and Building Superintendents.

The fifth annual meeting of the Association of Railway Superintendents of Bridges and Buildings was held at Hotel Grunewald, New Orleans, Oct. 16 and 17, president George W. Andrews (Baltimore & Ohio), of Philadelphia, presiding. At the opening session prayer was offered by Mr. Joseph H. Cummin (Long Island).

Mr. J. L. White, Superintendent of Bridges and Buildings, representing Mr. E. H. R. Green, President, presented a very handsome banner to the Association on behalf of the Bridge and Building Department of the Texas Midland Railroad. The roll-call showed about 50 members present, in addition to a large number of visitors, chiefly prominent railroad officials of New Orleans and vicinity. Seven new members were enrolled. The Southern Pacific and Queen & Crescent invited the members to excursions to points of interest on their roads.

The annual address of President Andrews dwelt chiefly on the prosperity of the Association and the important position it was gradually assuming. He spoke of the necessity for publication of advance copies of committee reports for distribution among members and the technical press prior to the holding of the annual convention which recommendation was subsequently adopted by the Association. After the transaction of considerable routine business, appointment of committees and reports of the various officers, the question of changing the name of the Association was taken up, resulting in the adoption of "Association of Railway Superintendents of Bridges and Buildings."

The following committees presented progress reports and asked to be continued: Mechanical action and resultant effects of motive power at high speed on bridges. Best and most economical railway track pile driver. Span limits for different classes of iron bridges and comparative merits of plate girders and lattice bridges for spans from 50 ft. to 110 ft.

Valuable and carefully prepared committee reports on the following subjects were presented:

Methods and special appliances for building temporary trestles over washouts and burnouts. Chairman, R. M. Peck (Mo. Pacific).

Strength of various kinds of timber used in trestles and bridges. (This report will be found in another column.) Chairman, W. G. Berg (Lehigh Valley).

Best method of erecting plate girder bridges. Chairman, H. M. Hall (B. & O. S. W.).

Sand dryers, elevators and methods of supplying sand to engines, including buildings. Chairman, Aaron S. Markley (C. & E.).

Best method of spanning openings too large for box culverts and in embankments too low for arch culverts. Chairman, James Stannard (Wabash).

Pumps and boilers. Chairman, John H. Markley (T. P. & W.).

During the balance of the afternoon session the following subjects reported on at last year's convention at Kansas City, Mo., were taken up for further discussion: Depressed Cinders; Best Method of Bridge Inspection; Maintenance of Pile and Frame Trestles; and Best Scale Foundation.

The resulting discussions, while limited in time, were very lively, especially with relation to creosoting of timber and piling. The representatives in the meeting from the Louisville & Nashville, the Queen & Crescent and the Southern Pacific testified in unqualified terms as to the economy resulting from the use of creosoted timber and piling, especially for solid gravel top-trestles used so extensively on their roads. The discussion on the best scale foundation indicated that the choice of a particular kind of foundation was entirely a question governed by local circumstances, but that in any event the principal features were to secure good drainage of the pit and an unyielding foundation.

Wednesday's morning and afternoon sessions were devoted to discussion of the committee reports, the election of officers, and selection of next year's meeting place.

A resolution was adopted recognizing the great value to railroad interests of the United States Government timber tests being conducted by the Forestry Division

11. Best and most economical railway track pile driver.

12. Span limits for different classes of iron bridges and comparative merits of plate girders and lattice bridges.

The following officers were elected for the new year: President, W. A. McInaghe, Duluth & Iron Range, Two Harbors, Minn.; First Vice-President, L. K. Spafford, Kansas City, Fort Scott & Memphis, Kansas City, Mo.; Second Vice-President, James Stannard, Wabash Railway, Moberly, Mo.; Third Vice-President, Walter G. Berg, Lehigh Valley, Jersey City, N. J.; Fourth Vice-President, Joseph H. Cummin, Long Island R. R., Long Island City, N. Y.; Secretary, S. F. Patterson, Boston & Maine, Concord, N. H.; Treasurer, George M. Reid, Lake Shore & Michigan Southern, Cleveland, O. The convention will meet next year in Chicago on October 20.

On Thursday the Association visited the Calumet sugar plantations west of New Orleans and enjoyed a delightful trip by boat to Bayou Teche. A notable feature of the business sessions of the Convention was the promptness and energy displayed in the conduct of the business. The tone of the discussions was more dignified and the talk was confined more closely to the subject in hand than in previous meetings. The reports presented were thorough and several of them are likely to be widely noticed and used. This association has members throughout the United States, and some from Mexican and Canadian roads, and deserves the hearty support of railroad managers.

The Atlanta Exposition—System of Awards and Juries.

The system of awards adopted at Atlanta is quite different from that at Chicago, and, indeed, is unusual. There is no one highest award in any one class. All the exhibits in one class might receive gold medals, or honorable mention, or nothing. Each exhibit is to be con-

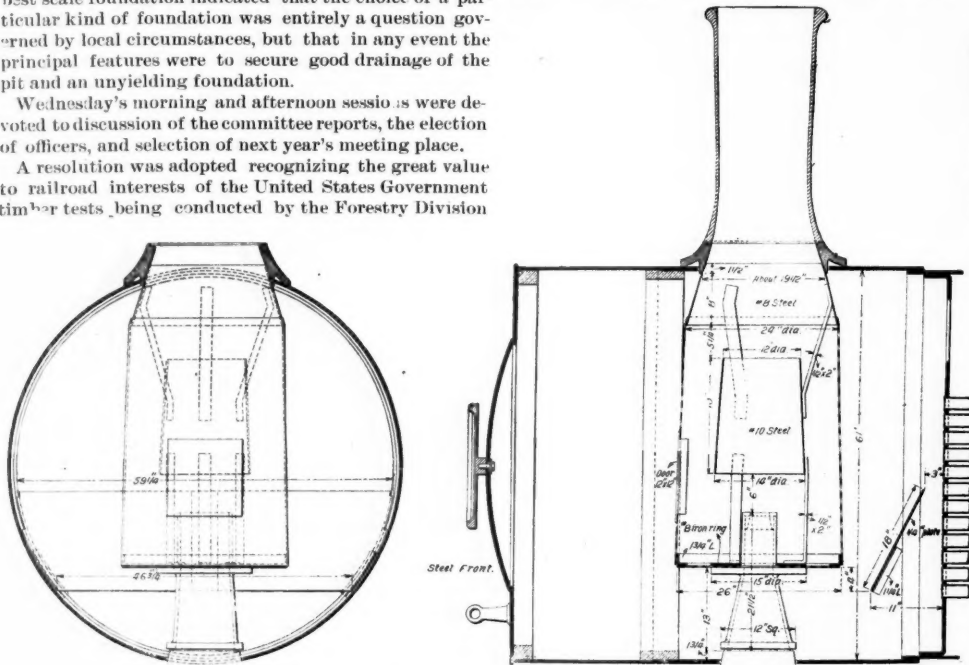


Fig. 5.—Smokebox and Spark Arrester, Lehigh Valley Passenger Engine.

of the Agricultural Department, and requesting Congress and Government authorities to hasten the publication of the results of tests thus far made.

The discussions on erecting plate girders and on spanning wide low culvert openings brought out prolonged and valuable debates. The plan of erecting plate girders alongside the running track and sliding into place on greased rails was considered generally the best. The use of old rails, covered with concrete and ties laid in ballast, is the preferable method of spanning wide low openings on permanent work, while trestles or a series of timber boxes will solve the problem for temporary work or for the first construction of new roads. Pumps and boilers and sand drying plants were thoroughly discussed.

The subjects for reports and discussion at next year's Convention are as follows:

1. How to determine size and capacity of openings for waterways.
2. Different methods of numbering bridges; should all waterways be numbered?
3. Drawbridge ends; methods of locking, including locking of turntables.
4. Protection of trestles from fire, including methods of construction.
5. Local stations for small towns and villages; plans of buildings and platforms.
6. Tanks, including frost proof protection to tank and pipes.
7. Shearing of rivets in plate girders and cause thereof.
8. Best system of report blanks.
9. Protection of railroad structures from fire.
10. Mechanical action and resultant effects of motive power at high speed on bridges.

sidered on its own merits and not as compared with any other. Three degrees of merit are recognized. The lowest award is honorable mention; then follow bronze, silver and gold medals. Each grade receives a diploma; in the highest three the diploma states that the exhibit is entitled to a medal. These awards are made by small department juries; but a board of highest award is constituted from the chairmen of the several juries, and a number of other men called in for the purpose, which will decide questions of difficulty and will pass especially on the recommendations of the juries as to gold medals. In fact, this board has full authority over the work of the juries. The names of the jurors in those departments especially interesting to our readers follow:

Commissioner of Awards.—Dr. Daniel C. Gilman, President Johns Hopkins University.

Transportation.—Rear Admiral G. E. Belknap, U. S. Navy; Mr. T. N. Ely, Chief of Motive Power, Pennsylvania Railroad; Mr. H. G. Prout, Editor *Railroad Gazette*; Commander T. F. Jewell, U. S. Navy; Mr. J. Elfreth Watkins, Smithsonian Institution, and Mr. I. N. Hollis, Professor of Engineering, Harvard University, assisting in special work.

Machinery.—Mr. T. C. Mendenhall, President Worcester Technological Institute; Mr. Winfield S. Chaplin, Chancellor Washington University; Mr. I. N. Hollis, Professor of Engineering, Harvard; Mr. F. C. Pratt, Pratt & Whitney Co.; Mr. C. B. Richards, Professor Mechanical Engineering, Harvard; Rear Admiral Belknap, U. S. Navy; Mr. R. H. Thurston, Director Sibley College, Cornell; Mr. Gustave Bissing, Chief Examiner Division A, U. S. Patent Office.

Electricity.—Mr. Henry A. Rowland, Professor of Physics, Johns Hopkins University; Dr. Louis Duncan, Johns Hopkins University; Mr. Brown Ayres, Professor

of Physics, Tulane University, New Orleans; Mr. Charles R. Cross, Professor of Physics, Massachusetts Institute of Technology.

Mining and Metallurgy.—Mr. John Birkenbine, Past President Institute of Mining Engineers; Mr. James B. Randol, Expert in Metallurgy, Passaic, N. J.; Prof. E. A. Smith, State Geologist of Alabama; Prof. H. Ries, Columbia College; Prof. F. P. Venable, University of North Carolina; Prof. J. W. Proctor, State Geologist of Kentucky; Prof. Ira Remson, aiding.

Engineering Public Works.—General Henry L. Abbot, Corps of Engineers, U. S. A.

Instruments of Precision etc.—Prof. Simon Newcomb, Superintendent Nautical Almanac; Mr. J. A. Brashear, Pittsburgh, Pa.

Board of Highest Award.—General Abbot and the department chairmen.

This list does not include all the juries, by any means; nor is it warranted to be complete and accurate for the juries given, except in the transportation department. In fact juries have been added to from day to day as needs developed, and no final official list has ever been published.

The jurors began work Wednesday, Oct. 16, and many of them have already finished and made their reports. It is expected that all reports will be in by Nov. 1, and that the results will be very promptly announced.

The Transportation Show at Atlanta.

It is natural that one who saw only two years ago the World's Fair at Chicago should immediately compare in his mind the Atlanta fair with that - to the inevitable disadvantage of Atlanta. So a fair, really remarkable in every way, suffers by a comparison which ought not to be made, but which one cannot help. The transportation department of the Cotton States International Exposition does not escape the influence of this unfortunate comparison. The first impression is that the show in this department is very meager; but after seeing the other departments we conclude that all have dropped from the standard set at Chicago in something like equal proportion. In fact the falling off in the transportation department is trifling compared with the tremendous let down in the department of electricity, for example.

The Transportation Building is a very simple and respectable looking structure 117 x 433 ft., giving with the galleries a floor space of 55,000 sq. ft., and it is pretty well filled, and contains a small percentage of absolute trash. Those who exhibit railroad material here are almost without exception substantial makers of standard articles; only two or three unfortunate "inventors" have crept in.

The Ramapo Iron Works and the Ramapo Wheel & Foundry Co. show frogs, switch stands, wheels and brake shoes, and have a really good exhibit. In the same space Mr. Newton Benjamin shows a method of making a metal tie out of old rails.

The Sterlingworth Railway Supply Co. shows three metal brake beams, the Canfield switch stands and a steel (combination) body bolster.

The Q & C company shows the Servis tie plate, also rail saws and small metal saws. Neither of these last exhibits, the Sterlingworth and the Q & C, is calculated to do justice to the articles shown. One not familiar with their merits would not get any idea of their value from the small and unattractive presentation - nor is there any one present to tell the visitors about the wares.

The Standard Steel Works have a small exhibit of steel tires. McKee, Fuller & Co., of Caetasauqua, Pa., show steel tired wheels and the American Steel Foundry Co., of St. Louis, shows the American steel truck and steel drawbars. All of these three exhibits are well installed and will attract attention, but these exhibitors also make the mistake of having no one on the spot to tell what they show and why they show it.

The A. French Spring Co., has a large and excellent collection of springs and shows a few specimens of pressed steel journal box lids.

The Johnson Company, of Johnstown and Lorain, shows street railroad track and a motor truck.

The Safety Car Heating and Lighting Co. shows the Pintsch system for car lighting in the transportation building and a gas lighted buoy in the lake. The installation is not at all what it might have been in attractiveness. Railroad men who know all about the system will see in it a familiar matter and pass it with a glance; others will not be likely to give it much attention, which is unfortunate, for there was a chance to do some good missionary work.

The Simonds Rolling Machine Co. has a capital exhibit. This includes samples of the wonderful variety of the product of that enterprising concern and a small working model of the machine. Here one finds also an intelligent representative who can tell visitors something useful about the processes and the product.

Of the two or three new car couplers shown, only one is worth mention. That is the Gaskins non-friction coupler by the Gaskins Car Coupler Co., of Arcadia, Fla. This is a M. C. B. coupler, simple in its parts, with a new idea in locking. The locking pin does not engage with the tail of the knuckle, but between the knuckle and the pin a bell-crank is interpolated, the knuckle engaging with the short arm and the locking pin with the long arm. The first object is to minimize the pressure on the pin, to permit it to be raised easily when the pull is on the drawbar. There is also a very simple

scheme for locking when the knuckle is only partly closed, to facilitate coupling on a curve. The coupler has had considerable trial on cars and is said to work well. At any rate, it is worth looking at.

In the train shed one will find the splendid Pullman train shown at Chicago. Nothing need be said of this. Everyone saw it there, and knows that it is the most beautiful and perfect train ever put on rails. As an example to be imitated, however, it cannot be commended. We regret that this great company did not show here an example of a train built for the health and comfort of passengers, and for economy in first cost and in maintenance. Here was a chance to do some useful work. The Pullman company shows also a street railroad postal car and the double-deck street car that was exhibited at Chicago.

The Plant system shows a fine example of a day train consisting of a 10-wheel Rogers engine, an express car, a combination baggage and smoking car, and two day coaches. The latter are Pullman built. The whole train is up to the very best modern practice in all details. The cars have lavatories, smoking-rooms, continuous parcel racks, Pintsch light, steam heat, air signal, and, in short, are complete in general and in detail. The Plant system has a special building on the grounds. In this building is gathered a beautiful display of the products of the territory which this railroad serves. The building itself is a pyramid of phosphate rock. Of course the stone is only skin deep, but the effect is striking.

The Southern Railway also has its own building on the grounds. This structure, designed by Mr. Gilbert, was shown in the *Railroad Gazette* of Sept. 20. In this building are collected specimens of the products of the South. The mineral exhibit is singularly rich, embracing coal, ores, marbles and other building stones, besides crystals and gems. The products of the forest and of agriculture also make a very impressive show. In the train shed the company has a Richmond consolidation locomotive, simple, a Richmond 10-wheel compound, a mail car, a day coach and a box car. All of these are good standard practice.

The Seaboard Air Line is represented only by an 8-wheel Richmond engine and a wooden model of an engine of 50 or 60 years ago. The Western & Atlantic shows the famous war engine "The General." These last two were also shown at Chicago.

The locomotive exhibit is not large. The Richmond Works show compound No. 2427, the 10-wheeler which has run on many lines the last year and a half, and which the irreverent now call the "tramp." Our readers ought to be familiar with this engine as we have described it and chronicled its doings repeatedly. The last record, that made on the Chicago, Milwaukee & St. Paul, we published within a few weeks. The Richmond company also shows an 8-wheel simple engine and is further represented by the engines in the Southern Railway exhibit.

The Rogers Locomotive Works have entered a 10-wheel engine and an 8-wheel engine and are represented in the Plant Exhibit by a 10-wheeler. The 10-wheel engine shown by the company was recently described in these columns.

The Baldwin Locomotive Works show three engines. One of these is a passenger engine for the Atlantic Coast Line and now called the "Atlantic" type. It is the Columbia type, but with simple cylinders. That is, it is an 8-wheel engine with a trailing truck. The cylinders are 19 x 24 in., the drivers 72 in.; the boiler, 58½ in.; grate surface, 26 sq. ft.; total heating surface, 2,047 sq. ft. The weight on drivers is 73,000 lbs. and the total 130,000. The main rod is 10 ft. 5½ in. long and connected to the trailing drivers. A 10-wheel passenger compound is shown, named "Atlanta." This has Vaucain compound cylinders 18 and 24 in. x 24 in.; drivers, 72 in.; grate surface, 18.7 sq. ft.; total heating surface, 1,824 sq. ft.; boiler, 58½ in.; weight on drivers, 93,580 lbs.; total, 131,680 lbs. The other engine shown by the Baldwins is a 6-wheel switcher, weighing 89,600 lbs., for the Central of Georgia.

Other exhibits in the car shed are a ventilated fruit car and a refrigerator car, by the St. Charles Car Co., and a box car with tubular under frame, by the Southern Iron Car Line.

This, we believe, sums up everything worth mentioning that is shown in the railroad and street railroad divisions of the transportation department. The carriage and bicycle exhibits are interesting, and some of them are remarkably good. The bicycle show especially is worth the attention of any mechanic or mechanical engineer, whether he rides or not. One who has not studied the details of bicycle construction can have no notion of the great skill and ingenuity which have gone into this great industry. Good judges estimate that the retail value of new bicycles sold in 1895 in the United States will be between \$35,000,000 and \$40,000,000.

Besides the articles shown in the various buildings, there are a few electric, naphtha and gasoline launches on the lake; and we should not omit a model and photographs of the Newport News shipyard, models of vessels shown by the Central of Georgia, and a relief map, paintings and models by the Northern Steamship Company.

Street Railroad Convention.

A report of the first session of the convention of the American Street Railway Association at Montreal, with a list of most of the exhibits, was given in our last issue.

The President in his annual address referred to the rapidly growing importance of street railroad interests, consequent upon the development made possible by the use of electricity. The changed conditions of operation required a higher order of ability in the management of the companies than did the old horse railroad, and a large number of well-equipped and educated men were now being attracted to street railroad service. He then gave general statistics of street railroads, as compared with figures for steam roads. Street railroads, he said, now operate about 13,300 miles in the United States, and the gross receipts were between \$125,000,000 and \$140,000,000. The street railroad mileage of the United States is about 7½ per cent. of the steam road mileage, and the passenger receipts about 45 per cent. of the passenger receipts of steam roads. The total capitalization of the street railroads is \$1,300,000,000, being about 11 per cent. of the capitalization of steam roads. The profits of the street railroads were about \$43,000,000. There are many branches of street railroad service, which will be more carefully developed in the future, such as handling freight and mail, the delivery of small parcels from retail stores through an express service, the handling of building material to suburban localities, the handling of milk on special cars, and the operation of funeral cars to cemeteries.

On Tuesday afternoon, Oct. 15, a paper on The Present Status of the Air-Brake, by E. J. Wessels, was read. Power brakes are as yet but little used, except on standard (steam) railroads, and Mr. Wessels spoke principally of the need of such brakes, in the interest of economy and safety. Air-brakes have been successfully used on the street railroads of Buffalo, and a great saving in wheels has been the result. The street car air-brake has been adopted by the Australian government, and is in use to a limited extent in Great Britain and on the continent of Europe. In this country, even where such brakes are used, they are intrusted to ignorant men and are not taken care of. Electric brakes are not thoroughly adapted to the purpose in view, as they are not available on trailers—that is, on any car that has not an electric motor. On cable roads compressed air is valuable not only as a brake power, but for adjusting the grip, and its use for the latter purpose prolongs the lives of cables.

In the discussion which followed, Mr. H. Scullen, of St. Louis, stated that he had had trouble with air-brakes in crowded sections through inability to maintain pressure in the train pipe owing to the frequent use of the brake. Mr. Wessels explained that these troubles were due to defective design of the brake.

Mr. R. McCulloch, of the same city, said that because of excessive repairs an otherwise successful air-brake in St. Louis had been given up.

The subject of paving was briefly discussed. The question of the necessity of abandoning operation during paving was raised and answered in the negative by several speakers. Mr. R. McCulloch, of St. Louis, said that several of his lines were being repaired with different kinds of pavement, and that the street railroad traffic was not delayed. He thought it improbable that the local authorities would allow the company to suspend traffic.

Wednesday morning was largely taken up by an executive session. The discussion on the subject of Transfers was opened by Mr. Sargent, who was followed by Messrs. Charleton, McCulloch, Jackson and Hurt.

On Wednesday afternoon Mr. Hamilton read the report of the Executive Committee together with the proposed amended constitution. At 3 o'clock the members attended a reception given by McGill University.

On Thursday morning the president announced committees on Ways and Means and on Nominations.

Mr. William J. Hammer handed in a communication enclosing a copy of a Preamble and Resolutions adopted by the committee on standard rules for electrical construction and operation of the National Electric Light Association, asking the co-operation of the American Street Railway Association, and urging the appointment of a representative to serve upon the proposed joint-committee. The resolutions spoke of the present diversity of rules relating to the installation and use of wires for electrical purposes and the importance of the establishment of one standard set of rules to be observed by all. Invitations had been sent to eight national associations covering electrical interests and to the General and Westinghouse Electric companies, each organization named to send one representative with full power to act for that organization in the preparation of the joint report, and such delegate to present said joint report to his organization for final approval and adoption by that body. A meeting of the joint committee is to be held in New York City on January 15, 1896, and the incoming Executive Committee was authorized to appoint a delegate to it.

A paper by Mr. N. W. L. Brown on Cross Ties and Poles for Street Railways was received and ordered printed, but was not read.

Mr. Frank R. Green of Chicago read a paper on Patents which was ordered printed and was referred to the Executive Committee. Mr. Green proposes that all patented articles offered to electric railroads be submitted to a committee of qualified men appointed for the purpose, which shall pass upon the validity and merit of the patent. The plan also contemplates the defense of any suits brought against members of the association for alleged infringements.

On motion of Mr. John A. Seely, the meeting expressed approval of the proposed exhibit of modern electrical in-

ventions to be given in connection with the convention of the National Electric Light Association in New York next summer. Mr. David stated that the exhibition will be of far more than ordinary interest.

On Thursday afternoon the report of the Ways and Means Committee was submitted, showing a deficit of nearly \$5,000. The committee recommended that the supply men be taken into the association as associate members, be allowed to attend the meetings, and to contribute toward the financial support of the association. The discussion resulting was lengthy and at times rather warm. The clause referring to supply men was finally stricken out and the report laid on the table. Upon motion by President Hurt, subscriptions amounting to \$4,275 were raised among the members.

The report of the Nominating Committee was then submitted and unanimously adopted. The officers for the ensuing year are as follows: President, H. M. Littell, Brooklyn, N. Y.; Vice-Presidents, G. C. Cunningham, Montreal, Can.; Wm. H. Jackson, Nashville, Tenn.; J. Willard Morgan, Camden, N. J. Secretary and Treasurer, T. C. Penington, Chicago. Executive Committee: Joel Hurt, Atlanta, Ga.; Prentiss Cummings, Boston, Mass.; C. G. Goodrich, St. Paul, Minn.; A. Markel, Hazelton, Pa.; W. F. Kelly, Columbus, O.

St. Louis, Mo., was selected as the place for the next convention.

On Friday morning the principal business transacted was the installation of the new president and secretary. Mr. J. F. McElroy, of Albany, discussed the subject of car heating, using a series of diagrams in illustration. The annual banquet was held at the Windsor Hotel Thursday evening. It was largely attended and was a success. The New York Central and the Central Vermont railroads ran special trains to Montreal, and the Wabash road ran one from the West. The delegates from Boston left that city on the Sunday previous and visited the White Mountains on the way to Montreal. The train carrying visitors from St. Louis and Chicago left the former city at 3 o'clock Sunday afternoon and stopped at Niagara Falls, reaching Montreal Monday evening. On the Wabash special there was a car specially fitted up for exhibition purposes, which gave the delegates on that train an opportunity to inspect many street railroad devices on the road. The New York Central special train stopped on the return at Lake Saranac, where the delegates were driven in carriages to the Berkeley and Riverside Inn to lunch. The guests were also taken to Lake Placid. The train finally left for New York at 8:30 p. m.

In our last issue we gave a list of exhibits in position at the time of going to press. Below we give a list of those which arrived later:

EXHIBITS.

Akron Insulator & Marble Co., Akron, O. Vitri-fied clay tubing, insulators, circuit breakers and electrical specialties.
American Railway Supply Co., 21 Park Place, New York City. Full line of metal badges and buttons.
Oscar Beaudry and Charles Leblanc, Ottawa, Ont. Model of automatic switch for street railroads, operated mechanically.
Cambria Iron Co., Johnstown, Pa. Girder and guard rails and steel T-rails and fastenings.
The H. B. Camp Co., Aultman, O. Vitri-fied clay underground conduits.
Canada Iron Furnace Co., Montreal, P. Q. Charcoal pig iron as used in the manufacture of car wheels and high-class castings.
H. O. Clark, Marlboro, Mass. Photographs of fender for electric street cars.
Composite Brake Shoe Co., Boston, Mass. "Safety" brake shoe for street cars.
Consolidated Car Fender Co., Providence, R. I. Full sized fender attached to the platform frame of a car.
Eastwood Wire Mfg. Co., Belleville, N. J. "Perfection" journal bronzes.
Albert Edwards' Car Fender Co., Brooklyn, N. Y. Model of street car fender.
Fitzgerald-Van Dorn Co., Chicago, Ill. Automatic draw-bar for elevated, cable and electric street railroads.
Forest City Electric Co., Cleveland, O. "Roll Drop" commutator bars.
Fulton Truck & Foundry Co., Mansfield, O. Models of Fulton electric street car truck, electric street car scraper and the Troy sand-box and a full sized portable hoisting apparatus.
Griffin Equipment Co., Boston, Mass. Steel frame car and steel truck.
C. W. Henderson, Montreal, P. Q. Bells, telephones, indicators and other electrical specialties.
Hunter Automatic Fender Co., Cincinnati, O. Model of fender for street cars. A full sized fender was exhibited on a car of the Montreal Street Railroad.
C. C. Kaufman, Kingston, N. Y. Kaltenbeck street car fender.
Meaker Mfg. Co., North Chicago, Ill. Street car register, overhead trolley construction, trolley hangers and mechanical clips.
Molyneux Electric Co., Buffalo, N. Y. Model of electric friction car motor.
New York Fare Register & Supply Co., New York City. Hughes fare register for street cars and the Brady wire cutter.
The R. D. Nuttall Co., Allegheny, Pa. Model of trolley for electric cars.
Ohio Brass Co., Mansfield, O. Wood flexible pole bracket, Walker trolley harp and wheel, the King straight under-running adjustable switch, type K metal-clad trolley hangers and type W cap and cone hangers.
Pennsylvania Steel Co., Steelton, Pa. Harveyized steel street railroad frog.
Portable Hoss Bridge Co., Detroit, Mich. Portable bridge constructed to allow street cars to pass in case the tracks are blocked by fire or other hose.
Robinson Electric Truck & Supply Co., Boston, Mass. Robinson radial electric street-car truck.
John A. Roebblings Sons Co., Trenton, N. J. Samples of wire-ropes and cables for street railroad work.
Roll Slipless Car Wheel Co., Wilkes-Barre, Pa. Leonard "slipless" wheel, having a double series of inclined oblong holes ex- ending through its tread and a circumferential rib running upwardly between the adjacent ends of the holes, thus forming a narrow continuous bearing surface.
St. Lawrence Machinery Supply Co., Montreal, P. Q. Engine cylinder, dynamo and machine oils, Davidson steam pump, Albany greases, magnesia sectional coverings, "Square Flange" Garlock and "Rising Sun" packings, boiler compound and mill and engineers' supplies.
St. Louis Register Co., St. Louis, Mo. "Security" street car fare registers.
Searritt Co., St. Louis, Mo. Rattan, leather and plush car seats.
Charles Scott Spring Co., Philadelphia, Pa. All kinds of spiral, elliptic, sash, trolley and yoke springs.
C. C. Sibley & Co., Postal Building, New York City. Elec-

is an adjustable spirit level in the center of the upper face of the board.

Fig. 2 shows the standard double-face sledge, to be made of steel and to weigh 12 lbs. Fig. 3 shows the standard track chisel, which is to be of steel weighing 4½ lbs. Fig. 4 is the standard spike puller, to be made of steel and weigh one pound. Fig. 5 shows the shape of the end of the standard track wrench, which is to be 22 in. long and weigh 5 lbs. The jaws are designed to fit both hexagon and square nuts.

Fig. 6 shows the standard track leveller. This has been patented by Mr. H. H. Sponenburg and is the only one of the standards that is patented. In leveling track two pieces like that shown in the lower left hand corner of the figure are used, in conjunction with the black and white striped board or plate, which is held in a position transverse to the rail by a standard and thumb screw, as shown in the drawing. In raising a low joint the trackman places the small triangular piece at the low joint (see B, below) and clamps it to the rail; the board or plate is placed at C, a suitable distance beyond the low point, and at the point of sight, A, the trackman has a triangular piece similar to that which is clamped to the low point, but not fastened to the rail.

A B C

Solid Floors for Railroad Bridges.

The practice of the use of solid floors in railroad bridges is extending in the United States quite as rapidly as one could expect. The theory has spread considerably faster than the practice, until now the objections which were heard only five years ago are seldom raised, and the advantages are pretty generally admitted. What those advantages are it is hardly necessary for us to recite here. A paper on this subject by Mr. Henry Goldmark, read before the Western Society of Engineers, is published in the August issue of the *Journal of the Association of Engineering Societies*, which paper is a somewhat interesting contribution to the theory and practice of solid bridge floors. What follows is abstracted from that paper and from the discussion which followed:

At quite a recent period in American bridge practice, even for the shortest span, the use of eyebars and rods, connected by small pins, was universal, while the connections of the lateral and floor systems were made in the loosest way. The author mentions a 60-ft. iron deck span on a well-known Western road which was made up of some 300 members and details connected by pins. The vibrations of this bridge under a moving train were quite alarming, although the sections of the truss members were in virtual agreement with the usual strain sheet requirements.

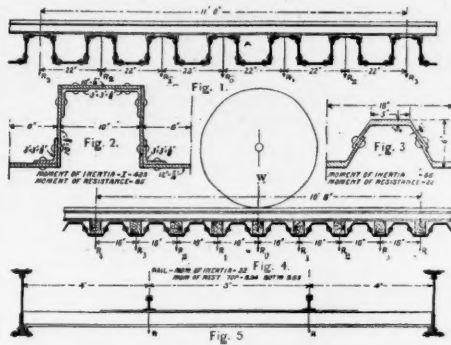
As was outlined in a recent paper on Bridge Deflections by Mr. Malver A. Howe, in the *Journal of the Association of Engineers*, an abstract of which we published recently, the proper design of a floor system is of great importance in securing absence of vibration or deflection. Mr. Goldmark puts it as even in advance of the design of the trusses. It is the part which must withstand the most violent shocks and strains, and must also serve as an important part of the lateral bracing. An increase in engine weight or a decrease in wheel base without any change in the total loading may have a dangerous effect on the floor. A case was cited in which by merely shortening the driving wheel base of a 10-wheel engine about 12 in. the strains in the floor beams and stringers were increased fully 20 per cent. A safe bridge floor should be what it was called by the early English engineers, a platform; that is, an unbroken surface from one end of the span to the other, strong enough and rigid enough to support a moving or even a derailed train at any point. The floor systems designed for and now being constructed for the track elevation and the new Union depot at Providence, R. I., are specially good examples of this type of bridge flooring. This construction was described in the *Railroad Gazette* for July 12, 1895. If a floor meets the requirements above outlined, it will go far toward making a total collapse of the bridge impossible.

In speaking of stringers and guard rails for bridge floors, Mr. Goldmark thinks that to ensure safety there should be at least four lines of iron stringers, the outer ones being close to the trusses, and strong timber ties spaced very closely, say from 4 to 6 in. The guard rails should consist of iron or of timbers protected by iron angles, and it is desirable to have an inner as well as an outer rail. Such a floor, however, would be expensive and difficult to renew, would be in constant danger of catching on fire, and at best its life would rarely exceed eight to ten years. With heavy engines the ties are likely to be cut and the rail joints to become loose. Even the best timber floors come far from fulfilling all necessary requirements as to safety and durability.

A number of American roads have within the past few years begun the construction of solid or continuous floors of iron or steel such as have been used for many years in England. These consist, as a rule, of a series of troughs running transversely to the main girders to which they are fastened. In some cases beams replace the troughs, the beams being closely spaced and covered by a continuous steel plate. The rails are either fastened directly to the iron troughs or to the timber cross-ties. In the latter case there is often a ballast filling, so that adjustments in the track can be made by tamping. Without unreasonable expense such floors possess many advantages over timber floors, presenting as they do an unbroken and uniformly strong surface. The track may be run at any angle and frogs, and switch connections can be placed

anywhere on the bridge. As a system of lateral bracing such a floor is unexcelled. The avoidance of fire risks is a valuable point, while when a very shallow floor is necessary the trough construction is often the only feasible form.

Mr. Goldmark makes a calculation of the distribution of a single concentrated load throughout the different troughs of two types of floor system. These two sys-



tems are illustrated in the accompanying engraving. The problem consists in finding out in what proportion W is carried by the different troughs, so that when this is known the strains on the troughs and rails may be computed by the ordinary theory of beams. The following equations are deduced for the type of flooring shown in Fig. 4:

$$\begin{aligned} R_0 &= .192 W \\ R_1 &= .173 W \\ R_2 &= .120 W \\ R_3 &= .080 W \\ R_4 &= .031 W \end{aligned}$$

In the same way for the second type of flooring, shown in Figs. 1 and 2, we obtain:

$$\begin{aligned} R_0 &= .39 W \\ R_1 &= .26 W \\ R_2 &= .09 W \\ R_3 &= .045 W \end{aligned}$$

The various reactions being represented by the letter R , with varying sub-letters, as shown in the engraving. Having thus obtained the proportion of a single concentrated load carried by the different troughs, calculations may readily be extended to any system of axle loads desired. By combining the percentages of W thus concentrated on the different troughs, we find that the distribution of the load over all the troughs of the floor will be nearly uniform. These results enable us to compute the greatest strains likely to occur in any one trough with a degree of accuracy fairly comparable with that obtained in the other parts of bridges. The point as to the effect of an inefficient rail joint on the distribution of the load has been raised. Some computations have been made by the author with the joint plates supposed to be entirely removed. The results indicated that even in this case the maximum load on a trough is but slightly increased over the proportions tabulated above.

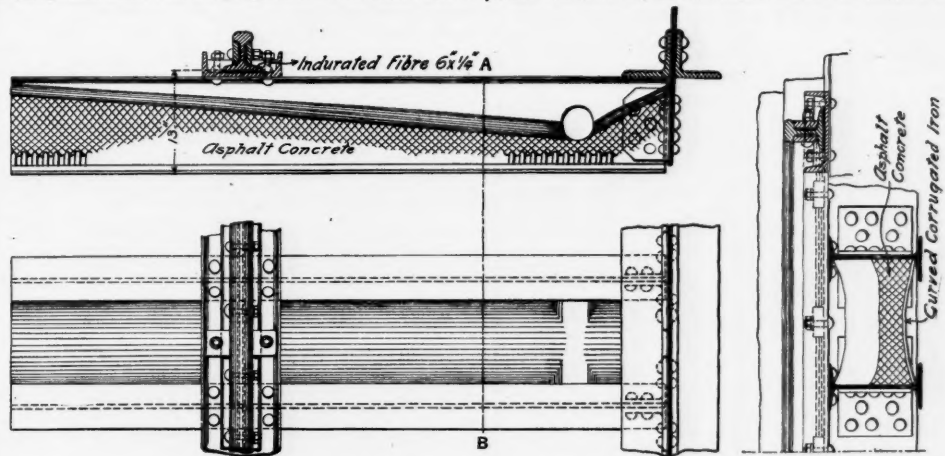


Fig. 6.—Horton's Solid Bridge Floor.

In the discussion Mr. Wallace spoke of five bridges having a style of flooring similar to that described by Mr. Goldmark that have been in service for five years on the C. M. & N. Division of the Illinois Central. These five bridges are on what is known as the Clyde Viaduct where the Illinois Central crosses the C. B. & Q. west of Chicago. One of these bridges is a 150-ft. span. The other four are plate girders. The trough was a square one about 12 in. deep. The ties 8 in. thick rest on a reversed angle placed 6 inches below the top of the trough, thus giving the rail 2 inches clearance above the iron work.

Mr. Horton supported Mr. Goldmark in his suggestion that bridge designs should be simple, using materials from the rolls of large sizes rather than small. If the flange of a girder requires a total section not exceeding what may conveniently be procured in two angles use two angles only. Relieve the girder of stiffeners except where there is some reason to suppose that they are useful. It would be far better to put the weight of useless stiffeners into extra thicknesses of web or other parts to the end that the structure shall be better prepared to resist shocks as well as destruction caused by rust.

A novel type of solid flooring is shown in Fig. 6. This

flooring was designed by Mr. H. E. Horton, and consists, as will be seen, of transverse I-beams riveted by connecting plates to the webs of the girders, between which beams arched corrugated iron plates are placed, resting on the lower flanges of the I-beams. Over this plate a filling of asphalt concrete is placed which slopes toward each side of the bridge from the center, drain gutters being formed near the girders at each side of the bridge as shown. The rails are bolted to two channels which extend longitudinally throughout the bridge and are riveted to the transverse beams. To the web of these channels and between their two flanges the rail is bolted, the space between the flanges and the rail being filled with indurated fiber. The channel shown in the drawing is a 10-in. section weighing 30 lbs. per foot, and the rail is 80 lbs.

Roadway Department Economies.*

The great business depression over the United States for the last few years has been a national economical educator for the railroads in all their departments, and the roadway department is somewhat like the rheumatic, who is first to predict a storm and the last to appreciate its passage; it is the first to suffer in all financial depressions and the last to realize the return of good times.

In consequence the Roadmaster, for the last few years, has had a great deal to contend with in decreased force and material, while at the same time he was expected to keep his track in the same safe condition as heretofore. The Section Foreman has been required to maintain his track with about two less men, and the work train handle the material for the sections, ditching, and other repairs, with a reduction of about 25 per cent. in force.

The question may be asked, "How is it possible for the same amount of work to be done?" Of course no one will say that the same amount of work is done, and all work that can be left to take more or less care of itself for a few years is allowed to pass; but all important work is done, and done perhaps as well as heretofore. The Section Foreman has had to apply himself to the work in a manner he was never accustomed to. Instead of letting his work go to be attended to in the regular course of events, he has had to study out new methods and put into operation economical methods that were at one time thought impossible. The result is that our dull times have made better men, and when the business of the country improves and brings with it the force of former years, the track will be maintained in a far better condition than ever before, and at no greater cost than formerly.

One effect of the times has been the weeding out of all careless and slovenly foremen and men. Foremen who are careless of their own property, are naturally careless with that of others, and the proper place for all such is in the ranks of the laborers.

As necessity is often the mother of invention, a few of the time-enforced improvements in doing work, and found to work to advantage, are below explained:

Work Train.—The most expensive luxury in the roadway department is the roadway engine. This engine, however, can be made to be the most important feature in facilitating and economizing work in the roadway department.

Unloading Rails with a Chain.—In unloading rails, say 45 ft. long that are loaded on two 30-ft. cars, they can be readily unloaded from the rear end with a 15-ft. chain, requiring only the engine crew and eight laborers. This is done by first cutting off the car that is acting as part idler, place the hook of a 15-ft. chain under the track rail at a tie, and the other end of the chain (which

is provided with a clevis) to the end of the rail to be unloaded. The engine then moving ahead, the projecting end of the rail will gradually rest on the track, forming an easy curve, until the other end of the rail drops on the track—the dropping being made easy owing to the great length of the rail, and unloading from the rear end of the car. Two men attending to this chain are all that are required, while six men with bars throw the rails out of the track. In this manner a car containing 60 rails was unloaded in 50 minutes.

Unloading Rails by Hand.—In unloading 45-ft. rails by hand we found that it could be done at about one-half the expense of 30-ft. rails, eight men on the car with tongs sliding them off the rear, while eight men on the ground would carry the projecting end of the rail to outside of the track, and holding it in that position while the engine moved ahead. Then the eight men on the ground move along the rail and take hold of the other end as it leaves the car, and lay it also outside of the track. Sixteen men and an engine in this manner unloaded 100 tons of rails a day, and at the same time got out of the way for the business of a first-class railroad.

Renewing Rails with an Engine.—By stringing the new rails outside of the track in 600-ft. lengths, they can be strung so that the first stretch may be moved into its place and make a proper joint; the succeeding stretches cannot be so carefully placed, but the engine will readily move them backward and forward by the use of the

*A paper by A. Morrison, Roadmaster of Lehigh Valley Railroad, read at the meeting of the American Society of Railroad Superintendents, New York, Oct. 14, 1895.

switch rope, 15-ft. chain, or bumping stick; and by the use of a 15-ft. switch point to make connection with the old rail, it is possible in this manner to renew rails during week days and accommodate a large traffic. While the traffic (at certain times of the day) is too great to change rails, or while waiting for the passage of certain trains, the men can be employed in stringing the rails, or preparing the track for the rails to be put in with the engine when the opportunity arrives.

Changing Rails.—Roads composed of numerous heavy curves, making necessary the changing of the high rail on account of the wear on the side of the head, by exchanging the places of the higher and lower rails, can get almost as much again wear out of the same rail. There is no quicker way of doing this than by cutting the rails wherever the short rails are located, providing they are not further apart than 600 ft., by throwing both rails in, and one stretch of rails over the other so as to exchange places. The engine will readily move them the required distance backward or forward. With broken joints the distance is about 15 ft., with 30-ft. rails, and by making connections with a 15 ft. point, same as in renewing rails, this work can also be done and accommodate a large traffic on week days.

A great advantage in using the engine is that it makes it unnecessary to remove the numerous bolts and splices (the bolts and nuts being often rusted together fast and difficult to unscrew), and allows of a larger proportion of the force of men to adze and properly prepare the ties, so that when the rails are in position they conform to the desired contact with the wheel tread. By the use of an adjustable spotting board, which can be set to turn in the inner rail and the outer rail as much as desirable (I recommend the former to be $\frac{1}{2}$ and the latter $\frac{1}{4}$ in.), very perfect and satisfactory work can be done, and no guessing about it.

Moving Switches by an Engine.—Occasionally it will be found necessary on all roads to move a system of switches, or a leader in a yard, to accommodate some other improvement. If the distance is not too long for a wrecking rope, or combination of short ropes to reach, an engine can pull one turnout at a time readily, by first removing the track intervening between the old and new locations, excavating the ballast to the bottom of the tie, cutting the track loose between the turnouts, and putting 1-in. boards under the ends of the switch timbers, lapping them in the direction the switch is going to be pulled, which is done very readily by the use of jacks. Fasten each end of a chain around the rails and sill on each side of the switch, preferably behind a joint, hook the engine rope to the middle of this chain so as to prevent the strain from being greater on one side than the other and thus twist the switch timber; the engine will then pull the turnout to its required position. Put in the connecting rails and splice up track. The engine now moves ahead, prepared to pull each consecutive turnout in like manner. A leader has been moved in this manner in one day, which could not possibly have been done with the same force of men in ten days.

Building New Track.—Having about 20 miles of new track to build last year, we found it more economical to lay what track was to be laid with tie plates, by placing the plates on the ties previous to laying the rail and spiking them down with the rail, instead of putting the plates in after the track was laid and ballasted. Of course the projections under the tie plates did not enter the tie until the ballast engine passed over them, when they were found to go readily to their places and maintain the proper gage in doing so. Previous to allowing this engine to pass over the unballasted track, all irregularities in surface that would injure the rail were properly taken care of. Any tie plate that is not strong enough to bear this strain without damage is entirely too expensive to apply.

Ballasting.—This track was ballasted with slag up to the bottom of the tie, which slag was all received in quarter coal cars. Any person who ever handled slag knows what a difficult and expensive material it is to deal with. In order to overcome this difficulty we placed a tie immediately in front of the rear wheels of each car dumped, and dumped as many at a time as the engine could handle. By moving the train of cars, with men on cars with bars pushing down the material, it was uniformly distributed level with top of rail. The tie, being square, slid in front of the wheels quite naturally and prevented them from being derailed. In this manner we were able to handle the slag at about one-half of the usual cost. After the track was raised and tamped to grade and the slag leveled so as not to extend above the bottom of the tie, anthracite ashes were distributed in like manner. In this way one engine has unloaded in one-half a day with 18 men 160 cars, which was equal to 1,000 cu. yds.

Other Uses of the Work Train Engine.—If the work train engine is only required to take the men to and from their work, it should be so arranged that this engine attends to the distribution of material for the sections, which frequently requires such assistance, and if it cannot be employed, it should be turned over to the transportation department from the time of delivering the men at their work to the time of taking them home in the evening. When we take into consideration that this engine costs about \$25 per day, including the crew, it will be readily seen that, a force of laborers costing \$25 a day, it increases the cost of every day's labor performed 100 per cent. Hence the practice of running a work train with a small force of laborers is an expensive luxury. Any work train composed of less than 50 laborers will make the average rate of each day's labor higher than any contractor would figure on doing work. Of course there is always work on the railroad that cannot be done by contract, and is only possible to reach by use of an engine; but the force of laborers should bear such a proportion to the cost of the engine that the cost of each day's labor is within reason.

Organization of Work Train.—To get the proper economical results from a work train, the foreman should be the conductor, and be responsible for the safety of the train with the engineer. A conductor who is conductor only should not be tolerated, there being too many opportunities for him to sleep in the caboose, making it impossible for him to have the necessary exercise to give his brain freedom to work. He will consequently antagonize the foreman, who is particularly interested, and is held responsible for a fair day's work. By the foreman acting as conductor it gives him a knowledge of the trains that he would not otherwise have, which enables him to arrange his work to better advantage, and especially smaller items of work (which consume so much of the train's time), so that it can be done between the time of certain trains. This conductor must be an expert foreman, qualified in all branches of track work. He should be provided with an assistant foreman, thus enabling him to give more time to the trains than otherwise would be possible, and if his force is large enough to require it, he should be furnished with a timekeeper.

Equipment.—The engine on this train should be a passenger engine that is somewhat too old for such service, but still in fair condition and not too light. The caboose, supply car and regular train of service cars should be equipped with air brake and air whistle, and

whenever going a considerable distance it is qualified to run as a section of a passenger train with perfect safety. It is surprising the amount of time that is lost by work trains going to and from work, and in passing over the road for any considerable distance during the day, when done by taking their chance with the other traffic.

Sunday Work.—The roadmaster who has a corps of properly instructed foremen and studies his work well, how to do it and when to do it, will find it possible to do all his work, with few exceptions, on week days, except when close to cities with large suburban travel, terminals or parts of road with sufficient trackage for large business. There should, however, be a positive reason for doing this work on Sundays, not only from a religious point of view, but one of economy. The trackman who does a fair day's work for six days in succession, needs the seventh for rest, and should by all means get it. If he is required to work 13 days and rest on the 14th, the company who pays him is getting from one-half to three-quarters day's work for every day he is paid during the last six. Any man who has been a close observer in this matter will, I am satisfied, corroborate this statement.

The practice of spending six days preparing a large amount of work to be done on Sunday with all the section gangs that can be conveniently gathered together, which is generally a rush to get the large amount of work done, is expensive, and the same good work can never be done where so many foremen are working on some other man's section. Aside from this matter of economy, it is well known that the railroad laborer has less opportunity of spending a few hours socially with his family and friends than perhaps any other class of men, and to deprive him of this, even on Sundays, is depriving him of the greatest humanizing and civilizing influence he comes in contact with. The best foreman or the best laborer is he who has an opportunity to think and build up for himself a comfortable home; it is he who can always be depended upon to conscientiously give a fair day's work for a fair day's pay.

The Moore Steam Pump.

The novelty of the steam valve action in this pump makes it particularly interesting. The accompanying engravings show the design of the pump, and a perspective view of the steam cylinder and piston. The valve motion for the steam (cylinder is shown in both engravings. As will be seen, it is annular in form, and slides up on the body of the piston, its motion being limited by the piston heads. Steam ports are formed in the body of the piston, as shown in the section. The course of the steam is shown by the arrows. The entrance of steam at C, slides the valve into the position shown, and allows steam to enter the body of the piston at A, from whence it issues at B, thus moving the piston. Later in the stroke, it enters through D and E, and full steam is obtained. Exhaust takes place through the other steam port and hollow piston rod, as shown in the sectional view. By making the two steam openings A and E in the valve seats of different areas, the motion of the piston is gradual until the water valves close.

The exhaust may be turned either into the atmosphere or into the suction chamber, where it is taken up by the suction water and warms the latter sufficiently to prevent railroad tanks from freezing up in winter, with ordinary weather and traffic.

To cause the valve to shift easily, a relief port is provided which allows the steam between the valve and piston-head to escape to the front of the piston-head, equalizing the pressure.

The few parts in this pump, and their simple arrangement, should make it a very efficient and durable machine. The Union Steam Pump Co., of Battle Creek, Mich., makes the pump. It is claimed that it will do the same amount of work, on given dimensions, 25 per cent. cheaper than any other pump.

Train Accidents in the United States in September.

COLLISIONS.

REAR.

2d, on New York & Sea Beach, near Woodlawn, N. Y., a locomotive collided with a passenger car in consequence of the inability of the engineer to shut off steam; owing to an accident to the throttle lever; he reversed the engine, however, and the wheels remaining on the track, it ran back, after the collision, and struck a long passenger train standing at Woodlawn station, the engineer and fireman having been thrown off by the shock of the first collision. The standing passenger train consisted of 17 light open cars, well loaded, and over 40 passengers were injured, two of them fatally.

10th, on Atchison, Topeka & Santa Fe, near Sealy, Tex., an empty engine ran into a preceding empty engine and both fell into the ditch. Three trainmen were injured, one fatally.

12th, on Chicago, Burlington & Quincy, at Altona, Ill., a freight train broke in two, and the rear portion afterward ran into the forward one, making a bad wreck. There were 15 oil tanks in the train; one of them took fire and the wreck was burned up. The fireman was killed and another man was fatally burned.

13th, on Chicago & North Western, in Chicago, Ill., a passenger train ran over a misplaced switch and into some freight cars standing on a side track. The engine was injured.

21st, on Bangor & Portland, near Nazareth, Pa., a passenger train ran over a misplaced switch and into some freight cars standing on a side track, doing con-

siderable damage. Two passengers and one trainman were injured. The switch had been tampered with.

21st, on Chicago & Alton, near Drummond, Ill., a freight train broke in two and the rear portion afterward ran into the forward one. Eight cars were wrecked. Two tramps were killed and one injured.

21st, 3 a. m., on Fitchburg road, near Erving, Mass., rear collision of freight trains during a dense fog, making a bad wreck. The fireman was fatally injured.

21st, on Mobile & Ohio, near Percy, Ill., a freight train broke apart in two places and the detached portions afterward collided, wrecking several cars. A tramp was killed and another injured.

22d, on Southern Railway, near Stewart, Miss., a freight train broke in two and the detached portions afterward collided, wrecking 26 cars; conductor and one brakeman injured.

24th, 11 p. m., on Pittsburgh, Fort Wayne & Chicago, at Verner, Pa., a freight train ran into some freight cars which had run out of a siding and stopped on the main track and the engine and several cars were wrecked. The engineer was injured.

25th, 1 a. m., on Pennsylvania lines, near Bellevue, Pa., a freight train ran into the rear of a preceding freight, wrecking the caboose and 6 cars and badly damaging the engine. The engineer was injured. There was a dense fog at the time.

27th, on Illinois Central, at Gallman, Miss., a freight train broke in two and the detached portions afterward collided, killing the fireman and a tramp and injuring 2 other tramps.

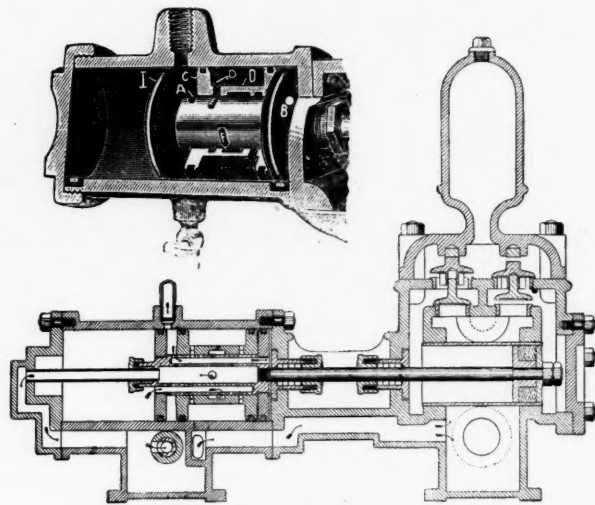
And 16 others on 12 roads, involving 2 passenger and 22 freight and other trains.

BUTTING.

3d, on Lake Shore & Michigan Southern, at State street, Chicago, butting collision between a passenger train and an empty engine. Several passengers were injured.

4th, on Dunkirk, Allegheny Valley & Pittsburgh, at Falconer, N. Y., passenger train No. 2, which was delayed in backing into the side track, was run into by passenger train No. 1, both engines and several cars being badly damaged. Three passengers were injured.

7th, on Cincinnati, New Orleans & Texas Pacific, near Blanchet, Ky., butting collision of freight trains, wrecking both engines and several cars. One engine fell down a high bank. The fireman and a tramp were



The Moore Steam Pump.

killed. It is said that an operator had failed to deliver a meeting order to one of the trains.

9th, on Delaware & Hudson, at Harpersville, N. Y., butting collision between a freight and a work train, injuring 4 employees.

11th, on Great Northern, near Melby, Minn., butting collision of passenger trains, wrecking both engines and the forward cars of both trains. Two engineers, one fireman, one mail clerk, one express messenger and two tramps were killed. Eight passengers and 5 trainmen were injured. It is said that one of the trains disregarded a telegraphic meeting order.

18th, on Cleveland, Cincinnati, Chicago & St. Louis, at Greensburg, Ind., butting collision of freight trains; fireman killed and several other trainmen injured.

18th, on Bangor & Aroostook, near Presque Isle, Me., butting collision between a special train carrying the State railroad commissioners and a switching engine, damaging both engines. Two of the passengers were injured.

20th, on Chattanooga & Lookout Mountain, near Lookout Mountain, Tenn., butting collision of passenger trains, injuring 7 passengers.

And three others on three roads, involving one passenger train and five freight trains.

CROSSING AND MISCELLANEOUS.

6th, on Baltimore & Ohio Southwestern, at Cincinnati, O., collision between a passenger train and a switching engine, damaging both engines and several cars. The passenger engineer was injured.

18th, on Southern Pacific, at Los Angeles, Cal., a switching engine was run into by a runaway gravel train and its boiler exploded, wrecking the engine and several cars. The fireman was badly injured.

21st, 10 p. m., on Staten Island Rapid Transit, at St. George, N. Y., collision between a passenger train and a freight, badly damaging one passenger car. One passenger was injured.

26th, 11 p. m., on Baltimore & Ohio, at Tunnelton, W. Va., passenger train No. 1, westbound, while passing from double to single track, struck the rear car of passenger train No. 4, eastbound, which was standing at the station not entirely clear of the westbound track, badly damaging the rear car of No. 4. Twelve passengers were injured, some of them by escaping steam. The engineer of No. 1 mistook a white light on a coal tippie for a clear signal light, authorizing him to proceed, the danger signal being obscured by smoke or steam from the engine of No. 4.

And 7 others on 7 roads, involving 13 freight trains.

DERAILMENTS.

DEFECTS OF ROAD.

26th, on Pittsburgh, Fort Wayne & Chicago, at Allegheny, Pa., three passenger cars of a passenger train were derailed by a broken rail on the bridge across the

Alleghany River and ran some 150 ft. on the sleepers; but no one was hurt.

27th, on Chattanooga & Lookout Mountain, near Chattanooga, Tenn., a passenger train was derailed by a broken rail, and 3 employees were injured.

30th, on Southern Pacific, near Malone, Tex., a passenger train was derailed at a point where the roadbed had been softened by rain, and the engine and first 2 cars were overturned. The engineman was fatally scalded.

DEFECTS OF EQUIPMENT.

2d, on Atchison, Topeka & Santa Fe, near Wenona, Ill., a freight train was derailed by a broken wheel and 13 cars were wrecked. A brakeman was injured.

7th, on Kansas City, Fort Scott & Memphis, near Monmouth, Kan., a passenger train was derailed by a broken axle just as it approached a wooden bridge, and the cars running against the trusses weakened the structure so that it gave way and with a part of the train fell to the creek 20 ft. below. The stream was swollen, but the passenger car was not submerged. Ten passengers and 3 trainmen were injured.

10th, on Chicago & North Western, near Evansville, Wis., a freight train was derailed on a bridge by a drawbar which was pulled out and fell upon the track, and several cars fell into the river. Two men were killed.

13th, on Michigan Central, at Marshall, Mich., an express train was derailed by the breaking of the forward truck of the locomotive. The engineman was badly injured.

14th, on Alabama Midland, near Gordon, Ala., a freight train was derailed by a drawbar which fell upon the track, and the conductor and one brakeman were injured.

16th, 3 a. m., on Louisville & Nashville, near Bonnieville, Ky., a freight train was derailed by a brakebeam which broke and fell upon the track, making a bad wreck; one brakeman and one tramp killed and 3 tramps injured.

And 7 others on 7 roads, involving 1 passenger train and 6 freight trains.

NEGLIGENCE IN OPERATING.

4th, 3 a. m., on Southern Pacific, at Creston, Cal., a freight train was derailed by a misplaced switch and 8 cars of cattle were wrecked. The fireman was injured.

12th, on Brooklyn Elevated, at Adams street, Brooklyn, N. Y., a car in a passenger train was derailed and partly overturned by a misplaced switch, which was thrown by a signalman while the train was passing over it. The car was well filled, but the passengers all escaped injury.

15th, on St. Louis, Vandalia & Terre Haute, at Collinsville, Ill., the engine and first car of a passenger train were derailed at an unfastened switch. The fireman was killed and 2 other trainmen were injured.

16th, on Philadelphia & Reading, near Sinking Springs, Pa., a freight train was derailed by a derailing switch and 6 cars were wrecked. The engineman and fireman were injured.

17th, at the Union Station, St. Louis, Mo., a passenger train of the Baltimore & Ohio Southwestern, being backed into the station, became uncontrollable, and crashed through the bumping block at the end of the track. Two women on the platform were injured.

17th, on Erie & Pittsburgh, at Sharpsville, Pa., a passenger train was derailed at a misplaced switch and 2 trainmen were injured.

24th, on Baltimore & Ohio, at Elwood, O., a freight train ran over a misplaced switch and into some cars on the side track, and the engine and 20 cars were wrecked. The engineman and fireman were injured.

29th, on Long Island road, at Seaside, N. Y., a passenger train being run into the station after the engine was detached, became uncontrollable and crashed into the bumping post at the end of the track. One car was damaged and two brakemen were injured.

And 2 others on 2 roads, involving 1 passenger train and 1 freight.

UNFORESEEN OBSTRUCTIONS.

1st, on Seattle, Lake Shore & Eastern, at Lake, Wash., a passenger train was derailed by a tree which had been burned in a forest fire and had fallen across the track. The engineman was badly injured.

2d, on the New York and Greenwood Lake, at Singac, N. J., a passenger train was derailed by running into an electric street car on a crossing, and the engine fell down a bank. The fireman was killed. The street car was empty. The street railroad track at the crossing has a derailing switch located 50 ft. from the crossing which compels the street car to stop until its conductor goes forward to the crossing and closes the switch by a lever, and it is said that in this case the conductor of the car closed the switch and signalled the motorman to come ahead directly in the face of the approaching train.

2d, on Northern Pacific, near Maxfield, Wash., a passenger train was derailed by running over a cow, and the engine and baggage car were badly damaged. The engineman was injured.

9th, on Kansas City, Pittsburgh & Gulf, near Neosho, Mo., a work train was derailed at a washout; engineer and fireman killed and one brakeman injured.

15th, on Chicago & North Western, near Madison, Wis., a freight train was blown off the track by a cyclone and 10 cars were wrecked. Three trainmen in the caboose were injured, one of them fatally.

23d, on Missouri Pacific, near Gypsum City, Kan., a work train was derailed by running over a steer; engineman killed and fireman injured.

25th, 1 a. m., on Mobile and Ohio, near Lumbertown, Miss., a freight train was derailed by a malicious obstruction and 14 cars were ditched. A brakeman was killed.

27th, 2 p. m., on St. Louis, Keokuk & Northwestern, at Annada, Mo., passenger train No. 5 was derailed by running over a mule, and the sleeping and dining cars were overturned. Ten passengers and one employee were injured.

27th, on Lehigh Valley, at Stony Creek, Pa., a freight train was derailed by a tree which had fallen upon the track from a mountain side, and the engine and 15 cars fell down a bank, making a bad wreck. The tree had just been felled by careless wood choppers, one of whom at once proceeded to cut it up, but was too stupid to signal approaching trains. He did not understand English, and failed to flag the freight train even after he was instructed to do so by a track walker.

27th, on Altoona, Clearfield & Northern, at Homer, Pa., a passenger train was derailed, and one passenger car fell down a bank. Two passengers were injured. It is said that the track had been maliciously loosened.

30th, on Altoona, Clearfield & Northern, at Homer, Pa., a passenger car at the rear end of a freight train was derailed of a switch and fell down a bank. One passenger was injured. It is said that the switch had been tampered with.

And 5 others on 3 roads, involving 2 passenger and 3 freight trains.

UNEXPLAINED.

7th, on Missouri Pacific, near St. Joseph, Mo., a freight train was derailed and a tramp was killed.

15th, on Baltimore & Ohio, near Metz's, W. Va., a freight train was derailed while running at high speed, and 14 loaded cars were wrecked. Three tramps were injured.

16th, on Minneapolis, St. Paul & Sault Ste. Marie, near Annandale, Minn., 2 cars of a passenger train were derailed and fell down a bank; 15 passengers were injured.

23d, on Toledo, Peoria & Western, near Washington, Ill., the engine of a work train, which had been to Washington for water, was derailed and ditched, and the engineman and fireman killed.

30th, on Northern Central, at Croton, N. Y., a freight train was derailed and several cars of coal wrecked. Two tramps were killed and a brakeman injured.

And 7 others on 7 roads involving 2 passenger and 5 freight trains.

OTHER ACCIDENTS.

3d, on New York Central & Hudson River, at Rochester, N. Y., the locomotive of a passenger train was damaged by the breaking of a parallel rod. The fireman was injured.

22d, on Cleveland, Cincinnati, Chicago & St. Louis, near Leroy, Ill., a car in a freight train loaded with whiskey took fire and exploded, destroying the car and injuring two brakemen.

And 2 others on 2 roads, involving 2 passenger trains.

A summary will be found in another column.

International Conference for the Unification of Methods of Testing Materials of Construction.

In May, 1884, the late Prof. J. Bauschinger, of the Technical High School at Munich, called to order the first of the series of conferences, of which the last, just held at Zurich (Sept. 9, 10, 11) was the fifth. The continued success of these conferences is demonstrated by the increasing attendance and interest, every European state, as well as the United States of America, being officially represented. The United States War Department was represented by Capt. O. M. Carter, and the American Society of Mechanical Engineers by Mr. Gus C. Henning. The constitution of the conference is flexible and the deliberations are harmonious; and, without making binding resolutions, the results arrived at are adopted universally as the best expression of exact knowledge existing at the time. The "Resolutions of Conferences," published after each session, are now authoritative, but do not lead to excessive conservatism. This is proved by the new propositions relative to impact tests of cements and nickel impact tests of steels, which have recently been reported, and were made as a direct outcome of previous deliberations.

The various questions submitted at each conference, if not immediately answerable, are recommended to subcommittees.

At Zurich the following reports of subcommittees were presented:

Sub-Com. 2. Establishing Uniform Methods for Testing Paints as Preservatives of Iron Against Rusting; by Prof. L. de Tetinajer, of Zurich.

3. Appraising Relation of Chemical Composition and Resistances to Weathering of Natural Building Stones; Examination of Effect of Gases of Combustion; by Prof. Dr. Dietrich.

5. Determination of Normal Consistency for Resistance of Cement Mortars, and Especially of the Conditions, by which Equal Density is Secured in Tension and Compression Test Pieces; by Engineer Greil, of Vienna.

7. Quickest Methods of Testing Strength of Cements; by Oberlaurat Berger, of Vienna.

11. Study of Effect of Fœcal Matters on Resistance of Cements; by Major-Gen. Schoulatschenke, of St. Petersburg.

13. Comparative Bending Tests, and Statement of Most Appropriate and Simplest Methods of Measurements, with expression for flexibility; by Prof. B. Kirsch, of Vienna.

14. Study of Fragility Due to Acids: Methods for Determining It; by Prof. A. Ledebur, of Freiberg.

15. Study of Methods of Microphotographic Examinations of Metals. Review of Possibility of Establishing a Uniform Method of Testing. Propositions; by Prof. A. Martens, Berlin.

16. Contribution to the Study of Behavior of Iron (steel) Under Abnormally Low Temperatures; by Steiner, Gollner and Ludwik.

17. Methods of Testing Welds and Weldability; by Professor Gollner, of Prague.

19. Study of Ways and Means to Ascertain Reasons of Abnormal Fractures of Iron (Steel); by Chief Engineer Eckermann, Hamburg.

Besides the above a number of papers were read, as follows:

On the Results of Previous Attempts to Standardize Chemical Analyses of Iron (Steel), by Dr. H. Wedding. On the Necessity of Unification of Iron (Steel), analyses, by Baron H. de Jüptner. Appreciation of Impact Tests and Propositions for Making Them, by Prof. Dr. Kick, of Vienna.

On Tests of Cast Iron and a New Method of Investigating Materials by Autographic Recording Apparatus, by Gus. C. Henning. On the Present Condition of Tests of Paper, Textile and other Similar Fabrics, by Dr. Hofrat Exner, of Vienna. On the Present Status of Tests of Lubricating Oils, by Prof. Dr. Kast, of Karlsruhe. On the Present Results of Tests of Effect of Sea Water on Hydraulic Cements, by R. Dyckerhoff, of Amöueburg.

As the French Official Commission for the Unification of Methods of Testing Materials was in attendance in full and presented one report and several papers, particular attention should be called to its work.

While Mr. Polonceau translated the resolutions of conferences, Mr. Baclé did the same for the American Society of Mechanical Engineers' Committee reports,

and then compared these with the propositions laid down by the Commission. The unanimity of these three reports is striking, and shows that there is very little difference between the methods in all countries, and that no irreconcilable opinions or conclusions exist. With slight modifications after conference it seemed easily possible to come to a mutual modification and agreement. Several papers giving results of studies were laid before the conference, the principal of which were:

On Impact Tests of Nickel Steel Test Pieces, by M. Barba. Fragility of Steels, by Bès de Berc. On Chemical Analyses of Iron (Steel), by Ad. Carnot. On Methods of Tests of Woods, by Bès de Berc. On Methods of Tests and Inspection of Woods, by Bès de Berc. Penetration and Scoring Tests, by F. Osmond. On Internal Strain and Lack of Homogeneity in Ingots, by M. Barba. On Microphotography and its Application, and Introduction to the Knowledge of Metals, both by F. Osmond.

These papers are supplementary to the four volumes published by the French Commission since its organization in 1891, and are of the highest value and importance, covering a vast field of investigation.

The conference was called to order by Prof. L. de Tetinajer, the Chairman of the Standing Committee. The honorary presidents for the remaining days were:

For the second day, Dr. Hofrat Exner, of Vienna, Chairman, assisted by M. E. Polonceau and Prof. J. Benetti as honorary presidents; for the third day, Prof. C. Zschokke, of Aarau, Chairman, and Mr. Gus. C. Henning, of New York, and Prof. N. Bebelubsky, as honorary presidents.

The conference was carried on in two languages, German and French, and although this consumed much time, there was not the slightest hitch of any kind throughout the meeting. Although the discussions were, at times, very animated, there was no friction. It was intensely hot (83 deg. F. in the shade) but the arrangements were perfect.

Notes of some of the excursions may not be out of place. In Zurich there is an inclined cable road, raising passengers from the lake level to the hill on which the Polytechnic is situated. This consists of two boxes on wheels, connected to each other by a wire cable; to raise the boxes, water is admitted to the higher one until the load to be carried is overbalanced. A safety device is provided in the shape of an Abt rack gearing with pinions on the car-axes, controlled by brakes on the car platforms. The ascent of the Netliberg is made by an ordinary traction road with grades of over 6½ per cent. The peculiarity of this road, rising about 1,300 ft., consists in the method of descending, which came near being the cause of a serious and fatal accident. The road rises continually to the very top of the mountain without level stretches. Upon arriving at the top, with engine pushing the train uphill, the train is cut apart, and when the return trip is to be made the upper cars are dropped down by gravity. (To descend, the steam pressure is allowed to go down and the cylinders are used as air compressors; this compressed air operating against the pistons holds the engine and the three cars.) At the time in question, however, in order not to frighten men of such importance as the members of the Conference, strict orders had been issued not to execute this everyday manoeuvre, and the engineer was instructed to back up to get two cars; but he had allowed his steam to run down, and when he tried to back up, could not do so, and at each successive attempt his engine (and one car) dropped further downhill. When the conductor, who was on the upper cars saw this procedure, he took it for an invitation to drop down hill in the usual fashion, orders to the contrary, notwithstanding. Therefore he let his cars start, but he lost control, the crowd obstructing him, and the passengers became scared, and began jumping off, three being injured. The engine-driver acted promptly, running down hill, until the conductor had regained control of his cars and prevented a collision. This rapid descent raised sufficient pressure in the boiler to again ascend and pick up the cars which had been brought to a standstill.

The following day an excursion was made to Lake Luzerne, where three different kinds of mountain roads were examined, viz.: The Righi, the Pilatus, and the Stanserhorn. The Righi road is patterned after that on Mt. Washington, but the pins in the ladder rack are given the shape of rack teeth. The Pilatus road was built later, and is also operated by a rack, with alternate teeth however, lying in a plane parallel to the grade; this causes the shafts of the driving pinion to stand normally to the roadbed; to avoid possibility of the pinion rising out of the rack, hooks are provided which travel under the heads of the rails. The latest development of mountain roads is to be seen on the Stanserhorn, and is essentially a series of cable inclines driven by independent electric hoisting engines.

The following day after making a trip around Lake Luzerne, the members dispersed to reassemble at Stockholm, Sweden, in September, 1897.

Light Railroad in Wales.

A party of English capitalists have resolved to inaugurate a scheme for the construction of a light railroad into the Gower peninsula, South Wales, which, it is hoped, will open up that district and serve not only for the conveyance of the country produce to Swansea, but to introduce to tourists and others the beautiful secluded scenery which abounds in the neighborhood of Gower. The promoters of the scheme propose to utilize the present Oystermouth railroad to Blackpill and the old railroad along the Clyne Valley.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

As will be noted in our traffic columns, the executive officers of the roads west of Chicago have once more decided to restore and maintain rates, and the machinery of the various Western associations is being oiled up and put in motion. There was a crying need for this action. For the last six months there has been practically no association west of the Mississippi River having complete control of either freight or passenger rates. The Western Freight Association has, alone, among all its neighbors, maintained its existence, and it has undoubtedly served, to some extent, to hold the railroads in restraint. Chairman Midgley, however, recognized the inability of his Association to control the situation, as was evidenced by his recent communication to the executive officers, characterizing in sharp language their lack of judgment and good faith. The freight agents, at the command of their superiors have now voted to restore and maintain rates, both passenger and freight, throughout all territory within the jurisdiction of this association, and also within such territory as can be controlled by the remnant of the Western Passenger Association. The Southwestern Traffic Association is also making encouraging progress in regard to Texas rates. A new passenger association has been formed, with headquarters at St. Louis, to take charge of all interstate business to and from Texas points. The Colorado freight situation, however, remains critical and it is feared that unless an agreement is reached soon, the reduced rates now in effect to Colorado will again pull down the Missouri River rates. Efforts are being made, however, to get the Colorado lines together, with some show of success. The present movement (as to the general situation—not Colorado alone) will probably take the shape of an attempt to a gain put into effect an agreement similar to that of a year ago, which included a division-of-tonnage scheme, and which collapsed because two of the roads refused to abide by the decision of the committee, after having agreed to the percentages allotted them. It is said that the division-of-tonnage feature will be left out of the new agreement, which is to be modeled, to some extent, after the new agreement of the Eastern Trunk Lines. It is to be hoped that all the present favorable indications will prove true. In the face of the heavy freight movement which the roads now have reason to expect within the next six months, a failure to come to some agreement will be more than usually idiotic. So long, however, as it remains in the power of subordinate traffic officials to secretly cut a rate, there can be no confidence that any agreement which may be made at St. Louis next week will amount to any more than did its predecessor. It is a hopeful indication that the Western lines intend to follow the Eastern lines' example as regards the technical features of their agreement; it will be more hopeful to hear that they intend to imitate the Eastern lines' spirit—the spirit which leads the responsible managing officers to take a sufficiently active personal interest in competitive freight matters to see that their subordinates obey orders and live up to agreements.

In the electric street car disaster at Pittsburgh, noted in these columns last week, the number of fatal

injuries was five, and the case has aroused a good deal of comment. Many people acquainted with the circumstances are in a nervous frame of mind, and among suburbanites who formerly rode to and from the city on standard railroads there is even talk of going back to the steam cars. A correspondent writes us to ask if the street car companies do not realize that they are pursuing a dangerous course, and that they will sooner or later be subjected to oppressive legislation if they do not take more care of their passengers' lives. We do not know how fully they understand the ease with which a legislature can pass a law which will bear heavily on corporations, or the greater ease with which a law that is crude and harmful, without doing good to anyone, can be passed; but the suggestion is not out of place. Legislation is not the only thing to fear, however; the direct cost of such accidents is heavy and the indirect cost in loss of business may at any time become serious. It is not very apparent at present, for most roads are constantly extending their lines and their facilities, so that unfavorable influences are, or may be, concealed. Many street railroad managers already begin to see the result of high speed in a great increase of the accident expense account (as compared with horse car lines), and it cannot be long before the problem will obtrude itself so as to compel a rational solution. The Pittsburgh runaway is said to have been due to the failure of a brake-rod, and it was testified at the inquest that the breakage was such as to make the hand wheels on both ends of the car equally useless. Whether this was or was not so is not of great importance, for a good share of the runaways which we hear of occur when the car is crowded with passengers or under conditions of some other kind which make reliance on the rear hand-wheel futile. Everyone knows that a brake rod or brake chain may fail without warning; but while the duplication of the hand-brake apparatus is inexpensive and, therefore, should not be neglected, the real need is an automatic brake. The simple fact that these cars are heavy and run at high speeds makes this necessity so obvious that it seems almost ridiculous to state it: yet the frequently recurring disasters give plain evidence that many managers still class large electric cars with small horse cars, as far as safety devices are concerned; though it is scarcely necessary to remind the reader that this mistake is not made in the estimates of the number of passengers that can be carried and the increase of profit that can be accomplished by putting on larger cars and running them faster. There is no lack of automatic brakes for street cars, which have been shown to be practical.

"Sanitation of Passenger Cars" was the subject of a committee report at the meeting of the American Public Health Association held in Denver this month. Dr. G. P. Conn, of Concord, N. H., has favored us with a copy of the report, which is taken up chiefly with the recommendations of the Ohio State Board of Health, the action of the Baltimore & Ohio in carrying out those recommendations, and a letter from the Chesapeake & Ohio telling of the practice on that road. The most vigorous paragraph in the comments made by the writer of the report are those wherein he tells of his experience in trying to get a general passenger agent to take an interest in cleanliness, ventilation and the other things that come within the subject of the report, and which tend to preserve the health of passengers. The physician seems to have been considerably disgusted at the way in which railroad officers keep within their own departments. He had read the literary productions of this G. P. A. "with pleasure and profit," and he judges that the man who could produce such literature must have some thoughts on so important a subject as the prevention of disease, especially when it affects the prosperity of his own business; but not a word could the passenger man be made to say; he threw the whole responsibility off upon the shoulders of the operating department. This, in the case cited, seems to have meant the motive power department (which includes the car department), and the result of inquiries there was equally discouraging. The doctor concludes that the Superintendent of Motive Power, who naturally must give his first attention to the locomotive that is to draw the train, seldom carries his thoughts further back than the front end of the baggage car.

The statements made by the officers of the railroads mentioned above bring out in strong light the fact that the maintenance of clean air and clean water in passenger cars depends upon the energy and vigilance of the men who actually do the work, more than upon any other one thing. These roads furnish disinfectants and give the trainmen proper instructions, but the letters give no evidence as to whether enough disinfecting material is used or whether the instructions as to sweeping and dusting cars and cleaning out water tanks are carried out. We do not mean

to say that the orders are not carried out, but observations which we have made on other roads, large and small, lead us to congratulate these two very warmly if their men do keep floors, seats, closets and drinking tanks up to the standard of cleanliness set by the health officers. The alert and generative microbe knows so many tricks that he sometimes gets the better of us in spite of the most scrupulous care, while at other times he neglects to make an attack when it is invited by the most persistent slovenliness, so that it is not surprising that car cleaners come to have little respect for the rules except when a vigorous boss is in sight. The most practical rule that health boards could recommend concerning the cleanliness of cars would be one requiring an inspector with acute olfactories and an iron will, who does not have to do the work, to make a visit every day to all places where nuisances are likely to breed. There is always danger in having the scrubber decide for himself how often an apartment ought to be cleaned. As to water, aside from frequent scalding of tanks, which is necessary in any event, who knows of any practicable precaution except to boil or filter the entire supply? Cars are supplied at dozens of different towns on every road and from all sorts of sources. To boil or filter the water is an onerous burden, but let us frankly admit that, if we do not do that, we are practically continuing the old course of trusting to Providence. And, indeed, how many people have been made sick during the last five years by drinking mud or microbes on the cars?

The principal paper before the Western Railway Club at Chicago this month was a valuable one, and we hope to give extracts from it in a future issue. It is by Mr. J. Snowden Bell, and is a very useful compilation of historical facts about wide fireboxes. It is a quite complete exposition of the different types of large-grate boilers and is an important contribution to the history of locomotive practice. It contains a letter from Mr. James Milholland, one of the most versatile and ingenious railroad mechanical men of his time, written to the President of the Philadelphia & Reading Railroad in 1859, which is an interesting historical contribution. This letter indicates that Mr. Milholland appreciated the essential elements of value in our modern locomotive boiler practice, and goes to justify the enthusiastic opinion of the genius of Mr. Milholland held by some of his fellow workers, among whom are Mr. L. B. Paxson, Superintendent of Motive Power of the Reading, and Mr. Wm. P. Henszle, so well known as the veteran designer of the Baldwin Locomotive Works. The Western Railway Club is fortunate in getting such a good historical paper as this for its *Proceedings*. Papers like that are what make the bound volumes of the club's papers and discussions valuable additions to railroad literature.

Commendation of good deeds, as well as condemnation of bad ones, is an essential part of ideal discipline. This fact has been recognized by those who have recently discussed the abolition of punishment by suspension in the railroad service, but it is not so easy to devise just the right plan on which to keep the record which shall be the basis for commendatory deliverances. The reasons why you like a man, and determine to promote him as soon as you get a chance, are usually of a nature that cannot be readily defined in such a way as to be fairly compared with the same data about other men. The most commendable record among your men may be that of a person whose service has been wholly uneventful. Nevertheless it is well to make a beginning with a record, if for no other reason than to make sure how far the idea *cannot* be carried out; and we take pleasure in printing below, as an example, three extracts from a record which a certain superintendent has kept for several years. The names are fictitious:

May 10, 1893. *John Jones*.—A night freight train, of which he was engineer, ran through a landslide, consisting of mud and water. Engine passed through safely, but car near front end of train left track. Engineer used good judgment in stopping train gradually preventing other cars from piling up on car that was derailed.

Dec. 12, 1894. *James Brown*.—While freight train, of which he was engineer, was lying on main track at a meeting point to pass another train, which, per schedule, should have taken siding, he noticed latter train coming up main track. He remained at his post, reversed his engine, dropped sand, got his train moving backwards, and considerably lessened the force of the collision which followed, leaving his engine just in time to save himself from injury.

Jan. 29, 1895. *Thomas Robinson*.—While freight train, of which he was conductor, was waiting at a passing point, he boarded and stopped an engine which had run away from shops without any person on it. Engine was running about 20 miles an hour when caught. His action in this case was an especially courageous one, for, after seeing his brakeman and flagman (both expert, quick men) try to board the engine and fail, and notwithstanding the fact that he had a lame arm (the result of an old injury), he still made the effort, and, at the risk of his life, succeeded in mounting the engine his main thought being to save a passenger train which was about due. The latter train had been side-tracked by train dispatcher

and was out of the way, but this fact was not known at the time and place where the runaway engine was stopped.

As records of deeds these are models. How can we make an equally satisfactory record of conduct?

Union Pacific.

A committee has been formed to deal with the complicated affairs of the Union Pacific through reorganization. This committee represents particularly the first mortgage bondholders. It will be recollected that the United States Government consented to take a second mortgage on the Union Pacific main lines for its claims against the road, this mortgage now covering about \$53,000,000 for principal and interest after deducting sinking funds. While the question of a settlement with the Government was being debated and postponed in Congress the road was placed in the hands of receivers, the interest on the first mortgage being in default since July, 1894. There are in all (including land grant, bridge and other issues) about \$87,000,000 of bonds exclusive of the United States lien on both the Union Pacific and Kansas Pacific main lines, which require to be dealt with in any plan of reorganization and which are included in the present proposals. Only the obligations on the main lines are taken into consideration, all the branches and "system" roads being for the moment left out of account. The great need at present is to reorganize the main lines. Subsidiary properties and branch lines can be dealt with when the main part of the work is completed. Some of these are now undergoing independent reconstruction. Such a partial dismemberment of this big system was inevitable for it was too clumsy and incoherent a mass to be handled as a whole. No human power or patience could have brought about harmony between the countless antagonistic interests represented, as the events of the past two years abundantly prove.

The first mortgage bonds, which the committee was organized more especially to represent, become due in 1896, and the three following years, about the same time as the second mortgage bonds, guaranteed by the Government and now outstanding. Unless some arrangement is arrived at, the United States Treasury will be called upon to redeem about \$8,000,000 in 1896 and other amounts in succession thereafter, payments which in the present state of the national finances would be onerous.

The present committee, unlike previous ones, presents a pretty definite policy, which is to make some compromise with the government or else to proceed to foreclose the first mortgage. To this end a syndicate has been formed to purchase the overdue coupons and by this means, and by deposit of the bonds themselves with the committee, it is expected that the situation can be controlled. A summary of the committee's plan will be found in our news columns.

Congress has for years acted childishly in the matter of the Union Pacific debt. Certain Congressmen have opposed any compromise on the ground that the "sharks" should be made to "disgorge"; other western representatives have clamored for a foreclosure of the second mortgage in order that the Government might take and run the road, the object being to give to shippers west of the Missouri River lower freight rates than they were commercially entitled to or could get in any other way. The fact is, looking at the matter calmly, that the United States has in equity but a small claim against the Union Pacific. The road was projected as a war or national measure and the aid of the nation was granted to secure those indirect results. Nobody then supposed that a transcontinental line would be profitable, so that the original builders took great risks and were entitled to large gains. The evils connected with the old scandals, the Credit Mobilier and the like, however reprehensible per se, cannot now be cured. The scandals have been laid aside for many years and the present generation is called upon simply to solve a business problem. There is force in the argument that the Government has, indirectly, in the way of transportation of troops, quelling Indian wars and the like, received from the Union Pacific more than it lent to that company. The Government, like any creditor, should now take what its lien is commercially worth, and allow the road to be reorganized and put in a position to serve the territory and people adjacent to its lines.

Beyond those general considerations it seems that there is a definite purpose to utilize the main lines, when reorganized, in the interests of two existing companies. The committee, by its make-up, practically says that it is formed in the interest of the Chicago & Northwestern as regards the main line from Omaha to Ogden, and of the Missouri Pacific as regards the line from Kansas City to Denver. No doubt the creditors of the Union Pacific will gladly go into any plan which will give them the best results—and the present

plan is worked out very carefully—but it is not to be denied that the powerful interests supporting this plan may be opposed by other interests equally powerful when united, the latter being composed of those railroads whose transcontinental connections would be cut off or seriously interfered with by the absorption of the Union Pacific in the manner proposed.

The greatest element of doubt is concerning the action of Congress. We shall probably see again in Congress the old exhibition of demagogism or of small cunning, so that whether Congress will consent to any reasonable compromise is yet doubtful. If Congress refuses to act, will the committee be able to carry out its threat of foreclosure of the first mortgage? Good lawyers say that it will; yet the United States is not to be treated like an ordinary obstructing holder of a junior bond, and there is yet a good deal of doubt. Meanwhile the auxiliary lines must take care of themselves. It would be a great relief to the financial world and to business if the Union Pacific could be once more placed square on its feet and allowed to do its business in a proper way like other companies; and public opinion may yet become sufficiently crystallized to effectually demand a reasonable settlement of some kind; but we need not hide from ourselves the fact that the committee has only begun to uncover the difficulties which must confront it in attempting to solve what is perhaps the most difficult problem in all our long list of railroad bankruptcies.

The Brake Trials on the North Eastern of England.

In the *Railroad Gazette* of Oct. 11, was given an account of some experiments with compressed air-brakes on the North Eastern Railway of England, and last week we presented some criticisms on the way the apparatus was arranged. It will be of interest, further, to compare the coefficients of friction obtained in these tests with those found early this year by the Master Car Builders' Association Brake-shoe-test committee at Wilmerding, on the experimental apparatus. The table below gives the results from the North Eastern trials as near as we can get them from the data given.

NORTH EASTERN RAILWAY BRAKE TRIALS. (See <i>Railroad Gazette</i> , Oct. 11, 1895.)				
No. of tests.	Speed in miles an hour.	Per cent. of brake weight in train.	Average per cent. of retardation.	Co-efficient of friction based on columns A and B.
May 28. Quick acting.		A	B	
3	50.5	58.35	8.75	15.00
5	50.25	58.35	9.10	15.60
7	46.25	54.40	7.75	14.30
9	46.5	54.40	9.10	16.70
May 29. Quick acting.				
2	41.5	62.3	7.75	12.40
3	45.5	62.3	8.25	13.20
6	38.0	62.3	8.8	14.10
8	55.75	60.3	8.4	13.90
May 28. Common.				
10	62.00	54.40	7.0	12.90
12	59.75	54.40	6.7	12.30
13	50.5	58.35	7.05	12.10
15	45.0	58.35	8.4	14.40
May 29. Common.				
11	54.	60.3	7.0	11.60
14	41.	62.3	7.0	11.20
15	35.	62.3	6.25	10.00

We understand that the brakeshoes used in the North Eastern trial were of medium cast iron. The average coefficient of friction, with the speed varying from 46½ to 66½ miles an hour with the quick-action brake on May 28 was 15.4 per cent. On May 29, with the speed varying from 38 to 55½ miles an hour, the average coefficient was 13.4 per cent. With the common brake, without quick action, on May 28, the speeds varying from 45 to 62 miles an hour, the friction was 12.92, and on the 29th, with speeds from 35 to 54 miles, the friction was 10.93 per cent. The reason for the lower friction with the common brake is found in the method by which the friction is determined. The whole length of the stop is taken as a basis, but with the common compressed-air-brake the train runs a considerable distance before the brake is fully on, and this decreases the average friction. For this reason it is only the quick-action stops that can be compared with the Wilmerding shop test, as in those tests the brakeshoes were applied instantly.

It is not clear why the friction was less on May 29, with the quick-action brake, than on May 28. The difference is 2 per cent. in the average coefficient or 14 per cent. actual difference in the results. There may have been a difference in the weather, or in some of the details of the tests of which those who made the experiments may have been aware but did not record. If we take the average of the results with the quick-action brake, namely 14.4 per cent., probably a fair comparison may be made with some of the Wilmerding tests.

In the averages of the results from the North Eastern trials there is included a considerable variation of speed, but these trials show, as has been indicated by the Wilmerding tests, that the average friction is not much different at 60 miles an hour from what it is at

40 miles; that is, the average during the whole stop. It is a little greater at the lower speed. An important difference has been found, however, with different pressures per square inch on the brakeshoe. Unfortunately the pressure on the shoes in the North Eastern trials is not given, but it is approximately 6,000 lbs. per shoe for a loaded car. We do not know the area of the shoes and therefore cannot estimate the pressure per square inch. It is unfortunate that the data from these tests are not complete. We cannot tell whether the per cent. of retardation includes an allowance for the grades. We are compelled to take the results as given.

In the Wilmerding tests, made early this year and reported to the annual convention, only one pressure, namely 10,733 lbs., was used on the steel tired wheel, and only one speed, namely about 64 miles an hour. The chilled wheel was tested under the same condition of speed and pressure. The coefficient of friction with the steel tire and soft cast-iron shoe was 9.9. With the chilled wheel it was 14.9. With the hard cast-iron shoe it was 8.5 on the steel tire and 10.9 on the chilled wheel. This indicates an increase of friction with the chilled wheel.

With a low-pressure, namely, 2,798 lbs., and the chilled wheel, the average coefficient was 31.3 for soft cast iron and 20.3 for hard cast iron at a speed of 40 miles an hour. These wide changes in the coefficient of friction with a change of only 50 per cent. in speed, that is from 40 to 60 miles an hour, but with a change of more than 380 per cent. in pressure, led to the belief that the pressure had more effect than the speed on the differences in friction. Since then some preliminary tests have been made to corroborate these conclusions. The results, which have not yet been given out as final, point to some remarkable and valuable conclusions. At 60 miles an hour, with the steel tired wheel, the average results from a number of tests gave 13.2 per cent. friction with 10,733 lbs. on the shoe and 22.9 with 3,000 lbs., or an increase of about 73 per cent. with a decrease of pressure on the shoe from 10,733 to 3,000 lbs. The theoretical reasons for this are simple and need not be mentioned here.

These variable tests at 6,000 lbs. pressure gave a coefficient of friction of 17.4 with the wheel in ordinary condition; but with the wheel cleaned with benzine and the shoes cooled in water between the tests the coefficient rose to 21.6. Probably the first figure, namely, 17.4, corresponds more nearly with service condition, and should be used rather than the larger coefficient for comparison with those obtained from the North Eastern trials. The average of the North Eastern trials was 14.4 per cent., but if the results were not corrected for grades this figure would be increased after such correction and would make the comparison more nearly equal. Taken altogether the North Eastern results correspond as nearly as would be expected, considering the differences in conditions. This must be of considerable satisfaction to the committee, more particularly for the reason that it has been difficult to corroborate some of the remarkable results obtained from the shop tests.

There is soon to be a meeting in Pittsburgh of the two brakeshoe committees, representatives of brakeshoe manufacturers and all parties interested, for a discussion of the problem given to the two committees at the last convention, namely, the selection of the best types of brakeshoes for universal use.

September Accidents.

Our record of train accidents in September, given in this number, includes 50 collisions, 54 derailments and 4 other accidents, a total of 108 accidents, in which 38 persons were killed and 179 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS:		Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two.....	12	0	0	0	12
Misplaced switch.....	4	0	0	0	4
Failure to give or observe signal.....	0	0	0	1	1
Mistake in giving or understanding orders.....	0	3	0	0	3
Miscellaneous.....	7	1	1	1	9
Unexplained.....	5	7	9	1	22
Total.....	28	11	11	2	50
DERAILMENTS:					
Broken rail.....	2				2
Soft roadbed.....	1				1
Broken wheel.....	2				2
Broken axle.....	4				4
Broken truck.....	2				2
Fallen brakebeam.....	2				2
Failure of drawbar.....	2				2
Broken brakeroad.....	1				1
Misplaced switch.....	6				6
Derailing switch.....	1				1
Runaway train.....				3	3
Animals on track.....				5	5
Landslide.....				2	2
Washout.....				1	1
Malicious obstruction.....				3	3
Accidental obstruction.....				4	4
Cyclone.....				1	1
Unexplained.....				12	12
Total.....	28			54	82

OTHER ACCIDENTS.

Broken side rod.....	2
Cars burned while running.....	2
Total number of accidents.....	108

A general classification shows:

	Colli- sions	Derail- ments	Other accid's.	Tot'l.	p.c.
Defects of road.....	0	3	0	3	3
Defects of equipment.....	12	13	2	27	27
Negligence in operating.....	17	10	2	29	29
Unforeseen obstructions.....	0	16	0	16	16
Unexplained.....	21	12	0	33	31
Total.....	50	54	4	108	100

The number of trains involved is as follows:

	Colli- sions	Derail- ments	Other accid's.	Total.
Passenger.....	18	21	3	42
Freight and other.....	66	33	1	100
Total.....	84	54	4	142

The casualties may be divided as follows:

	Colli- sions	Derail- ments	Other accid's.	Total.
Killed.....	12	13	0	25
Passengers.....	2	0	0	2
Others.....	7	4	0	11
Total.....	21	17	0	38
Injured.....	21	29	3	53
Employees.....	76	38	0	114
Passengers.....	4	8	0	12
Others.....	1	0	0	1
Total.....	101	75	3	179

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed	Pass. Injured	Emp. Killed	Emp. Injured
Defects of road.....	0	0	1	9
Defects of equipment.....	0	10	3	8
Negligence in operating.....	2	77	13	31
Unforeseen obstructions and maliciousness.....	0	12	6	4
Unexplained.....	0	13	2	1
Total.....	2	114	25	53

Twenty-two accidents caused the death of one or more persons each, and 34 caused injury but not death, leaving 52 (48 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with September of the previous five years shows:

	1895.	1894.	1893.	1892.	1891.	1890.
Collisions.....	50	47	77	103	159	121
Derailments.....	54	91	75	84	92	120
Other accidents.....	4	8	6	6	6	10
Total accidents.....	108	146	158	203	257	251
Employees killed.....	25	30	32	68	54	73
Others killed.....	13	20	47	25	11	54
Employees injured.....	53	84	101	110	95	164
Others injured.....	124	42	99	125	103	174
Passenger trains involved	42	61	59	74	75	87

Average per day:

	1895.	1894.	1893.	1892.	1891.	1890.
Accidents.....	3.60	4.87	5.26	6.77	7.90	8.47
Killed.....	1.27	1.67	2.63	3.10	2.16	4.23
Injured.....	5.97	4.20	6.67	7.83	6.60	11.26

Average per accident:

	1895.	1894.	1893.	1892.	1891.	1890.
Killed.....	0.352	0.342	0.500	0.458	0.52	0.500
Injured.....	1.657	0.863	1.266	1.157	0.770	1.330

There was a collision in September (near Melby, Minn.)

in which five persons were killed, but all of them were men employed on the trains, and we find only one accident in the month in which passengers were killed; that at Woodlawn, on the New York & Sea Beach Railroad. This accident was reported in the *Railroad Gazette* of Oct. 11. The report of the New York State Railroad Commissioners, as published, while not discussing at great length the runaway, which was the prominent factor in this collision, makes a number of recommendations concerning the re-arrangement of tracks, switches and signals, to the end that switching operations, such as those that were going on at the time this collision occurred, can be more safely managed. It would appear that the railroad company did switching with too small a force of men, and that heavy trains were hauled with very light engines. The bad bridge accident of Sept. 7 at Monmouth, Kan., had a comparatively fortunate outcome, and the derailment of a passenger train on the bridge over the Allegheny River at Pittsburgh, on the 26th, is to be regarded as still more fortunate.

The very rare occurrence of a derailment in which every one was killed and no one was left to tell the tale, took place near Washington, Ill., on the 23d.

At Lawyers, Va., on the 16th, five persons in a wagon were killed by a train of the Southern Railway. At Little Silver, N. J., on the 24th, there was a similar accident, though only one of the five persons was killed. We have accounts of seven accidents on electric railroads in September, but they do not make so serious a record as we usually find, only 13 persons being injured and none killed. One of these accidents was a collision on a high elevated railroad at Hoboken, N. J. There were butting collisions at Colorado Springs, Reading, Pa., and Ridley, Pa. A runaway car at McKeesport, Pa., struck a passenger train of the Baltimore & Ohio. There was a derailment at Pittsburgh on the 27th, and a runaway near Providence on the 29th.

The new five-hour trains between New York and Boston over the Air Line, which were mentioned in our last issue, began running Oct. 21. It appears that in the parlor cars the fare through is \$7, the same as on the five-hour train over the Shore Line, the difference between the two trains being that the latter has no common passenger cars. The new train runs over the Providence Division of the Old Colony between Boston and Islington Junction, about 11 miles, and therefore enters and leaves the Park Square station at Boston, which is a larger station and nearer the center of the city than the New York & New England station. The train makes only one station stop, that at Middletown, 98 miles from New York and 115 miles from Boston. Engines are changed there, but the eastbound and west-

bound trains meet at Portland, about a mile east of Middletown. The trains start from Boston and New York at 1 p. m. and the 3 p. m. six-hour train via Middletown is taken off. As in the experiment of 1892 the Boston & Albany also puts on a new train each way, running through in 5 hours 32 minutes. These trains start at noon, one hour behind the heaviest day express now running over the Boston & Albany, and one hour ahead of the new five-hour train. During the past summer there have been two trains over the Shore Line, starting at 1 p. m. and 1:03 p. m., respectively, one running through in 6 hours and the other in 6½ hours. The first of these is now taken off, so that the net result is one less train by the Shore Line and one additional by the Springfield Line. The new noon train of the latter has the advantage over the new "Air Line Limited" of carrying parlor car passengers for \$6 instead of \$7, but it has a disadvantage of 32 minutes in time. The contract between the New Haven road and the Boston & Albany seems to be of such an awkward nature that it cannot be adjusted to changes in the business without considerable waste. The simple shortening of the time of the Air Line train (for that is what it amounts to) and the discontinuance of one of the Shore Line trains cannot be assumed to have been demanded by any increase of business, but rather the contrary; it is an attempt to stimulate business. It ought to be successful, but in order to try the experiment the New Haven road has to pay a penalty of \$100 a day, more or less; that is, the cost of running an unnecessary train from New York to Springfield and back, to enable the Boston & Albany to do what it can to detract from the success of the five-hour train. The only other way of looking at the matter is to assume that whenever the New York-Boston business needs additional facilities it always needs two of 'em at the same time.

The reduction of 8 per cent. in freight rates on wheat did not go into effect in California on Oct. 16, Judge McKenna, of the United States Court, issuing an injunction restraining the State Railroad Commissioners from enforcing their order. This action was taken on a complaint filed by the Southern Pacific Company. The company also seeks to have the Commissioners enjoined from carrying into effect the resolution by which it is proposed to make an average reduction of 25 per cent. in all rates of the road, to take effect Dec. 1, 1895. The complaint alleges that two of the Commissioners, La Rue and Stanton, were bound by ante-election pledges to reduce rates, and that La Rue is a large land owner and shipper of grain, and, therefore, not a fit person to act in matters affecting wheat rates. It is recited that if the reduced rate goes into effect, the railroad will lose \$1,500,000 annually, and will be seriously crippled.

It is reported that the Western lines are so well satisfied with the workings of their pass agreement during the present year that they will enter into a similar agreement for 1896. Taken as a whole, so far as can be learned, the agreement has worked fairly well. There have been some weak spots in it, which, no doubt, can be strengthened, now that they are known. Probably no one pretends to say that every member has faithfully observed all the provisions of the agreement or that no passes have been issued contrary to its provisions, but it has resulted in cutting off a large amount of useless free transportation. It is intimated that some of the members have been keeping tab on their neighbors pretty closely during this year and will insist that several loopholes which they have found shall be closed as a condition of their signatures to next year's agreement.

NEW PUBLICATIONS.

Statistics of the Railroads in Operation in the Argentine Republic, during the year 1893. By the National Railroad Board, Buenos Aires, 1895.

The wheels of governmental publication departments move with proverbial slowness, but there would seem to be more than usual dilatoriness in a bureau having supervision of so vital a matter as transportation which waits until 1895 to issue the statistics of 1893. This, which is volume second of the reports of the Railroad Board, is, however, a very creditable performance, containing an exhaustive analysis of all details of track, equipment, operation, and financial results, presented mostly in the form of tables, with succinct summaries.

A large part of the more interesting features of railroad operation in Argentina set forth in this work have previously appeared in the *Railroad Gazette*, but it is of some importance to note that out of a total of 1,137 locomotives in the republic in 1893, the United States had supplied 143. Of these 135 were built by the Baldwins, 4 by Rogers and 4 by Cook. Nine came from Canada, 71 from France, 20 from Belgium, 2 from Germany, 871 from England, and 21 are of unknown origin. The entire passenger equipment of the republic amounted to 1,522 coaches, of which 176 were sleeping cars; and the freight equipment consisted of 29,369 cars.

The highest speed made by regular passenger trains is 33½ miles an hour on the Buenos Aires and Eusemada line. On other roads the speed varies from 11½ miles to 30 miles an hour, not including stops. The total number of passengers carried was 12,847,042, the passenger mileage being 352,282,553. The total number of accidents was 896, occasioning 151 deaths, and wounding 207 persons. Of these accidents 595 were by derailments, 40 by

collisions, and 261 due to miscellaneous causes. The total number of employees on all railroads in the republic was 28,089, with a corresponding wage account of \$7,418,419. The report includes an excellent railroad map of Argentina, and a diagram giving curves corresponding to length of railroads, passenger and freight traffic, receipts and expenses from 1857 to 1893 inclusive.

TRADE CATALOGUES.

Rock Drills, Quarrying Machines and Mining Machinery. The Ingersoll-Sargeant Drill Co., 26 Cortlandt street, New York.

The 1895 catalogue of the Ingersoll-Sargeant Co. is a large octavo (or small quarto) pamphlet of 146 pages with a good alphabetical index. Of course the catalogue illustrates and describes and gives price lists of pretty nearly everything required in mining and quarrying work, because the company manufactures pretty nearly everything. Thus the pamphlet becomes really valuable as a treatise on material for excavating and mining and quarrying. The numerous styles of drills and drill mountings made by this company are well illustrated and described, as also its special quarrying machinery. An important line of air compressors is shown, and a special submarine drilling outfit. The company has made arrangements to manufacture the Pohlé air lift pump, which is shown and described in this catalogue. The pamphlet ends with some 38 pages entitled "The Record of Experience," which gives letters and extracts of letters from a great many users all over the world, showing the results that they have got with the Ingersoll-Sargeant tools.

Surface Grinding and Polishing Machinery.—The Diamond Machine Company, Providence, R. I., sends us an eight-page pamphlet with a number of illustrations of various machines for grinding and polishing. Two of them, an automatic surface grinding machine, for grinding flat metal surfaces where great accuracy is required, and a machine for grinding large and heavy work, are new. Price lists are given.

Suspension Bridges.*

BY LEFFERT L. BUCK, M. AM. SOC. C. E., Chief Engineer
New East River Bridge.

One of the non-resident lectures delivered before the students of the Rensselaer Polytechnic Institute last spring was on suspension bridges, by that master of the subject, Mr. L. L. Buck. The lecture is printed in full in the September issue of the *Polytechnic*, and we reprint a considerable part of it. We omit the detailed description of the ordinary construction and method of building of suspension bridges together with other material which is already to a greater or less degree common property; but we have selected for reproduction those parts of the address which show most of Mr. Buck's individuality; that is, which give his own ideas as to suspension bridges, and illustrate his methods of attacking this or any other engineering problem. The reader who reads with the eyes of his mind open, and who has the good fortune to know Mr. Buck, will not fail to find a great deal that is characteristic, especially toward the end, in the paragraphs beginning "Do not jump" and "You can never be certain."

My idea is that the suspension bridge is to be used in places where, for any reason, a more rigid structure is impracticable; and it should not be used where it is practicable to build a truss bridge or arch at less cost.

Various arrangements of the stiffening trusses are adopted by different makers. Some prefer a slip joint in the middle while the ends are made fast to the towers. Others make the truss continuous and fasten the ends in such a manner as to prevent verticle movement, while it is free to move longitudinally to satisfy temperature effects. Still another form is to hinge the cable at the middle, and from this point to the saddles to have straight chords capable of resisting both tension and compression, and then introduce web members between the chords and cables. An example of this style is furnished by the Point bridge at Pittsburgh.

Among these different forms my studies and experience have led me to favor the continuous stiffened suspended structure. Among the reasons for this preference, are the following:

First—The cables of a large suspension bridge are the most expensive part of it, even when constructed in the simplest form; and the attempt to secure web members to wire cables must add largely to their cost, beside being a very difficult and hazardous operation.

Second—I am opposed to exposing any more of the structure to wind pressure at a greater elevation than cannot be avoided.

Third—The floor must have some lateral stiffness; and in order to have it, it must have longitudinal members or chords.

Fourth—If the suspended structure is not stiffened vertically, every suspender receives a very much heavier concentrated load than when the structure is so stiffened.

Fifth—Every shock from the moving loads on the bridge is transmitted to the cables, instead of being largely absorbed by the floor system.

Finally, while there are other minor reasons for pre-

* Extracts from a lecture delivered before the students of the Rensselaer Polytechnic Institute. Reprinted from the *Polytechnic*.

ferring the suspended stiffened structure not necessary to mention, it is my opinion that it makes a much finer appearing bridge.

Now, supposing we have a suspension bridge to build, and that it is to be stiffened by suspended trusses. We have determined the intensity of our live load and the total load that is to come upon the bridge. The next thing to determine is the amount of undulation we are willing the bridge should have under the passing load. The first impression is that it should have none. But I do not think a certain amount of undulation is at all an objection. While it decreases the amount of stress upon the stiffening trusses materially, it allows the loaded portion of the cables to have a greater curvature than the unloaded portion; and consequently the dead load on the unloaded portion will balance, not only the dead load on the loaded portion, but a part of the live load as well. Deducting the intensity of the portion of the live load so balanced from the total intensity, the remainder is the intensity to be taken care of by the trusses. That is, to the remaining intensity we must apply the formulae for the stiffening truss.

Whether it is the cheapest bridge that could be constructed to do equally well, will depend on the length of the span and upon the locality, as well as upon the importance of the structure. To ascertain this, we must find out the cost of some other good form of bridge compared to that of the suspension bridge. Then there is the distance over which the material is to be transported. Of course, the greater the cost of transportation of material the greater the saving in the lighter bridge.

There is also another question that has arisen of late. That is, as to whether the cost of wire and wire-rope has kept pace with the decline in the cost of other materials used in bridge construction. If not, it will decrease the demand for suspension bridges. That is, it will cause their selection only in cases where the span is to be so great that any other style of bridge would cost more than a suspension bridge of equal capacity. There will always be a length of span for which the suspension bridge will be the cheapest, for the reason that the suspension bridge is capable of forming the longest span that can be built.

As to combining the cantilever and suspension forms, my investigations so far have not led me to favor such combination. As can readily be seen, they will not act in unison.

When the suspension bridge has half spans between the towers and the anchorages, it will readily be seen that with the middle span fully loaded the end spans will have an upward bending stress, due to the tendency of the portion of the cables over them to straighten on account of increased tension on them from such load. Or when both of the end spans are loaded and the main span empty, they will produce the same effect on the middle span. These must be provided for in the respective trusses. As it is a simple calculation, I need not do more than call attention to it.

But there is one problem which I have thought of somewhat, though I have never worked it out. It is this:

Where there are two half spans, beside the middle span, it is customary to hinge or secure all of them at the towers. It seems to me that where one has the problem to solve, it would be worth while to try the effect of leaving the trusses perfectly free at the towers, but make them continuous and let them be merely suspended from the cables. There would then be some vertical motion in the trusses at the towers, and consequently it would be equivalent to lengthening the spans of the trusses; but it might also result in rendering inclined stays from the saddles to various points of the trusses, not only of considerable assistance to the trusses but also to the cables. The problem would be worthy of investigation.

In case the middle and end spans are not continuous, I am in favor of anchoring the end spans to the anchor age masonry, and by means of compensating wedges and multiplying levers at the towers, preventing the middle span from having more than a given amount of end action, whatever the temperature. In this case the ends of all trusses at the towers will be secured against vertical movement. With this arrangement, inclined stays from the saddles to various parts of both middle and end trusses can be made very effective in assisting both trusses and cables. In renewing the Niagara trusses these wedges were used, and they were actuated by rods fastened to the rock on each side of the river. In the case of having end spans fastened to the anchorage, their expansion and contraction could be made to actuate the wedges.

I will now give you some hints in relation to designing a suspension bridge that, should you ever have it to do, may be of some assistance.

I suppose you will have studied the site for your proposed bridge thoroughly, and satisfied yourself that the suspension plan is best adapted to the conditions. Having decided upon a suspension bridge, make your design as simple as is consistent with the requirements and then thoroughly study every detail. I can only give you a general idea of the details. I will begin with the anchorage.

The anchor plate should be designed to suit the conditions. If the anchorage is to be of masonry, the plate can be made up of bars or beams and rolled plates of a form and stiffness effectually to distribute the pressure under the masonry, and it should be thoroughly imbedded in the masonry. The chains will extend vertically for some distance and then curve till they become tangent to the required direction of the cable at the

point of attachment. The spaces around the bars or chains should be left as open as possible until the weight of the structure and a portion of the live load at least is sustained by them. They can be first painted and then thoroughly imbedded in mortar, as there will then be little tendency for them to be disturbed by the stretch due to the load. In covering, be sure not to allow any stone to come in contact with the bars—nothing but clean cement mortar.

If the anchorage is to be made in solid rock, you should lay out your pits of a size not larger than is necessary to admit the plate edgewise and allow of properly placing the chains. Having laid out your pits, you will drill vertical holes along the boundary, as near together as they can be and not run into each other, and to the depth that the pit is to go. Then drill holes in the interior for light charges of dynamite. Never charge the boundary holes, as their object is to prevent cracking the surrounding rock. Dynamite is used as it is more local in its effects than common gunpowder. You must not crack the surrounding rock. Then, at the bottom, excavate a chamber of sufficient size to place the plate. The plate can, in this case, be made of cast iron or of separate bars, as may be found most convenient. If made of cast iron, the upper surface, which is to be the bearing surface, should be sloped downward from the bars, and outward all around about 30 degs. with the horizon. This form exerts the resultant pressure more directly against the rock. It also makes the casting less liable to crack in cooling and of greater strength for the same weight of metal.

It has been suggested by some engineers to use no roller under the saddles, but to depend upon the springing of the towers to accommodate the changes of length of cables from anchorage to tower, due to temperature and live load. I think it better to use rollers, so as not to bring the extra stress upon the towers, and also to avoid the extra tension upon the cables, as this extra tension comes upon the cables at the time when they have their greatest stress from decreased versed sine.

I see no good reason why a system of rollers cannot be designed for a large suspension bridge which will work freely as long as the bridge lasts. No jar or shock sufficient to disarrange them ever comes upon them. Suppose you are building a bridge of 3,000 ft. span between towers and support from the cables only the main span. The horizontal distance between the tower and nearest anchorage will be at least 800 ft. That means that between extremes of temperature there must be a motion of 8 or 9 in. at the saddle. It is better to use rollers, and those the best you can make.

The deflection upon which you base your calculation of stress upon the cables should be that due to the lowest temperature, as at that time they not only have their greatest stress, due to decreased versed sine, but that due to having to bend the trusses upward. The cables should all have the same versed sine.

The method of determining the proper depth of truss has already been explained, but I will speak of some matters that should receive close attention at the risk of repetition. In determining the depth of the truss it will be remembered that the force necessary to bend the continuous truss half its change of versed sine at lowest temperature must be afforded by the cables and the more shallow the truss the less the stress. The stress need not be very great unless you attempt too great rigidity. There is no good reason for making the truss more rigid than is necessary to prevent wear on the cables by bending them too much, or so much as to crack the paint with which the interstices are filled; and they will bend considerably when the bending is distributed over several hundred feet of the length of the cable. The bending of the trusses is perfectly legitimate so long as it is not enough to cause the unit stresses to exceed the amount they were designed to sustain; or, in other words, so long as they do not bend more than intended. In this connection it may be well to say that, as the safety of the structure does not so much depend upon the stiffening trusses, the unit stress can safely be allowed somewhat greater in this truss than in a bridge where the trusses afford the only support. How much greater must depend upon the conditions.

The trusses should be so designed that at mean temperature when fully loaded, they will be without stress. The members should then be made non-adjustable, and the proper camber given to them at that temperature. They will always remain in that adjustment so long as the stirrups of the suspenders are not meddled with. The stirrups are generally made adjustable; but they should be so arranged that when the bridge is once properly settled to its bearings and adjusted, they could be made difficult to tamper with.

As to the number of cables, I think it is better to have but two—that is, one on each side. There is then no question about the proper distribution of the weight on them.

Where there are two cables on each side it is not easy to distribute the stress between them. In a very great bridge there might be difficulty in putting the whole required section in two cables, and consequently four might be required. In that case, the suspenders should have an equalizing lever attached to a single stirrup.

Covering the Cables.—The usual course is to serve the cables the whole length with wire tightly wound. There is one trouble with this wrapping. In the course of a few years, in which the wrapping has been repeatedly painted, the covering of paint becomes quite thick. The elongation of the cable from live-load stress will not

crack the fresh paint at first, as the movement among the wrapping coils distributes itself among all the wires. But when the paint has become quite thick, it will have strength to keep the wires for two or three inches from separating, and consequently the whole movement for that length will be between two wires. Water is then admitted through the wrapping.

Probably a better way would be to band the cable tightly, every foot say, and then cover it with two half cylinders of plate iron or steel, the upper one overlapping the lower half a little. Then grip them tightly with the cable bands. Such covering would not only serve to keep water out, but it would serve to distribute the pressure from the suspenders. Its cost would be less.

The portions of the cables lying in the saddles are drawn so snugly that there is little chance for water to get among the wires, especially where they are kept painted. Nevertheless they should be covered with iron caps, which can be removed for purposes of inspection. The caps should overlap the other covering, to keep water from running down the inside of the latter.

So much for the main structure.

[TO BE CONTINUED.]

TECHNICAL.

Manufacturing and Business.

The Cleveland Twist Drill Co. announces that patents have been issued to the firm for its grip socket, the patent being dated Oct. 15, 1895. The issuance of this patent has been long delayed by an interference suit, priority of invention being claimed. The Cleveland Twist Drill Co. secured judgments in its favor in every court, and has finally secured the issuance of the patent, settling its right to manufacture the grip sockets.

The Ensign Manufacturing Co., of Huntington, W. Va., has recently taken orders for about 23 Russell snow plows, all for early delivery. These orders include 6 snow plows for the New York Central & Hudson River road to be delivered this season, a No. 3 double track Russell snow plow for the Boston & Albany; a No. 3 single track plow for the Erie & Wyoming Valley, and others for the Old Colony and the New York, New Haven & Hartford.

The Diamond Machine Co., of Providence, is to make an exhibit of its ball bearing grinder and other machinery for the use of bicycle manufacturers, at the Stanley Cycle Show, to be held in London, Eng., in November.

The Standard Car Truck Co. filed its charter in New Jersey last week. The capital stock is \$150,000. The incorporators are John C. Barber, of St. Paul, Minn.; B. F. Conkrite, of Chicago; Charles D. Thompson, of Montclair, N. J.; and Frank H. Hall, of Jersey City.

New Stations and Shops.

The Toronto, Hamilton & Buffalo has purchased land near Welland, Ont., for the erection of a roundhouse and repair shops.

Plans have been prepared for a brick passenger and freight station to be built at Alderson, W. Va., by the Chesapeake & Ohio.

The repair shops of the Pennsylvania at Wilmington, Del., are to be rebuilt on an extensive scale on a new site at Edgemoor, near the city. The proposal to rebuild the shops at Edgemoor was talked of some years ago, but was allowed to drop. It is now said that the condition of the Wilmington shops makes it desirable to begin work on new buildings at once. The plans which have been prepared call for an expenditure of \$800,000 altogether, which will be distributed over a number of years.

The Berlin Iron Bridge Co. has lately completed for Wilmot & Hobbs, of Bridgeport, Conn., a new rolling mill to take the place of the one lately destroyed by fire. The main mill is 126 ft. x 200 ft., with engine and boiler room in a separate wing 54 ft. x 90 ft. The construction is entirely fireproof and the roof is covered by the Berlin Iron Bridge Co.'s patent anti-condensation corrugated iron.

Iron and Steel.

The Crane Iron Company, of Catasauqua, Pa., has announced an increase of 10 per cent. in the wages of its employees. The increase is the second one in two months. Four hundred men are benefited by the increase.

The Sunbury Iron Works, at Sunbury, Pa., resumed operations this week after an idleness of four years.

A Russian Fair.

The traveller who is curious to know something of the condition of Russian industries will find a special opportunity next year, at the great National fair to be held in Nishni Novgorod, a considerable distance east of Moscow. To make this fair a success great reductions in passenger fares will be made. It is hoped to attract many foreigners, and extend the markets for Russian exports. To this end, further, it is purposed to make special reductions in the rates of freight on exports of Russian manufactures.

Russian Iron.

A correspondent of the *Glasgow Herald* states that a vigorous effort is being made to increase the iron trade of Russia. In the first place, he states, a great co-operative movement has been organized by the landowners of Eastern and Southern Poland—in the Soljesje districts particularly—for the working on the spot of the iron ore found there. It gives 57 per cent of metal, and the company are organizing ironworks, and intend to construct railways connecting with the trunk line to

Riga. For the first five years the payment of rent, etc., to the owners, is to be in shares. Again, there is more activity in the Ural iron region, efforts being specially directed toward transforming the antiquated methods of iron and steel production, so that Siemens-Martin steel may be made to supplant imported material. New discoveries of ore have been made recently, the most notable being a few miles east of the Black Sea. It is of the same quality as Bilbao ore, but with a remarkable freedom from sulphur and phosphorus, and is believed that the ore may be delivered at the port of Poti or Batoum for 13s. a ton, the distance from the mining field, Kutais, being very short. Another find is in the interior, on the banks of the Volga, at Sengelia and Simborsk. In this case the percentage of metal in the ore varies from 32 to 47 per cent, and is found in considerable pockets. These various movements, together with the extensive woods convenient in all cases for fuel, are regarded as most promising.—*The Practical Engineer.*

Four-Cylinder Compounds on the Paris, Lyons & Mediterranean.

Some comparisons between the four-cylinder compound locomotives which were put into service on the Paris, Lyons & Mediterranean Railway in 1893 show interesting results as regards fuel consumption. These locomotives have eight coupled wheels and are principally used for goods trains on the main line from Paris to Marseilles and for passenger and mixed trains on some of the heavy lines. Their normal speed is about 25 miles an hour. In comparing the consumption of fuel with that of the compound engines of the 1888 type and the non-compound type of 1881 it was found that the new engines saved 13.5 per cent. over those of 1881, while the 1888 compounds saved 10.5 per cent. over the non-compound type. The weight of these engines in working order is 52.85 tons and they use 213 lbs. steam pressure. The heating surface is 1,650 sq. ft. and the grate area 26.47 sq. ft. The high pressure cylinders are 14.7 in. in diameter, the low pressure 23.23 in.

A Hot Rolled Drive Screw.

We illustrate herewith a hot rolled drive screw, which has just been placed on the market by the Simonds Rolling Machine Co. of Fitchburg, Mass. This screw can be driven into wood with a hammer, and the blow turns the screw as it is being driven, and the fiber of the wood is compressed by the dull edge of the screw thread. The material used is a fine grade of tool steel. This is tempered in a brine mixture, giving to the metal a thin coating, which prevents rust. Twenty thousand of these screws have been ordered by the New England Telephone Co. The process employed by the Simonds Rolling Machine Co. in the manufacture of rolled steel articles, such as brake pins, track bolts and various kinds of screws and other forgings was described at length in our issue of July 21, 1893. The company makes a specialty of balls for ball bearings for cycles, turn-tables, water-wheels and many other purposes, and manufactures them at the rate of 1,000,000 a day. The output of brake pins, pedal pins and track bolts, especially the first named, is enormous. Considerable attention is now being given to the making of track bolts; the Pennsylvania Railroad has lately contracted for 5,000. The head and shank of the Simonds' bolt is hot rolled, and the nut is of forged steel. Wendell & MacDuffie, 26 Cortlandt street, New York, are the Eastern agents.

Street Car Lighting.

The Safety Car Heating & Lighting Co. has recently equipped the entire cable system of Denver with its system of lighting. The Pintsch gas is now being used on 120 cable cars.

Block Signals.

The Hall Signal Co. has a contract to equip 13 miles of the Norristown Division of the Philadelphia & Reading (double track) between Philadelphia and Norristown, with its automatic electric block signals. They will be arranged to stand normally at danger.

The Heilman Locomotive.

Two Heilman locomotives are being built for trial service on the Western Railroad of France. They consist of the locomotive proper weighing complete 110 tons, and a water tender weighing 18 tons. The tender has to be uncoupled every time the locomotive goes to the turntable. The division into two parts was made necessary by the insufficiency of the bridges. Steam power is to be furnished by a 1,500 H. P. Willans engine having a six throw crank, 12 cylinders, and no less than 30 pistons. This engine operates the generator, and another 50 H. P. engine is installed for the exciter. The first locomotive weighed 118 tons, inclusive of 13 tons of water, developing 700 H. P. with a boiler of 145 sq. m. of heating surface (1 sq. m. = 10.76 sq. ft.). It is maintained by competent European engineers that locomotives of the Heilman type could be built to weigh 100 tons complete, inclusive of 15 tons of water, and to develop 1,400 H. P. with a boiler of 280 sq. m. heating surface. The advantages claimed for the Heilman type of locomotive are independence from a central power plant, utilization of the entire weight of the locomotive for traction, absence of reciprocal motion and of forced draft, concentration of the entire machinery under the eye of the engineer, and the lifting of the boiler grade above the locomotive floor. Again, the possibility of maintaining an even speed of the locomotive throughout, the piston speed becoming independent of the wheel speed. An increase of the

engine speed will raise the voltage and thus maintain the motor speed on up grades. Some of the disadvantages are the addition of a third man on the locomotive and the loss from derailment of so costly a machine. For further accounts of this locomotive, and for an editorial discussion of its probable economies, the reader is referred to the *Railroad Gazette* of Nov. 9, 1894, also to pages 163, 210, 376 and 701 of the same year.

THE SCRAP HEAP.

Notes.

At Algiers, La., opposite New Orleans, on the evening of Oct. 20, a small iron bridge leading from a ferry house to a floating wharf at which ferry boats land, gave way under a large crowd of people and about 30 persons were injured. Two children are missing. The bridge seems to have been a new one, having just been placed in position.

Chancellor McGill, of New Jersey, has refused to make permanent the injunction obtained by the National Docks and New Jersey Connecting Railway Company against the Pennsylvania Railroad, which restrained the latter from preventing the junction company from tunneling beneath the tracks of the Pennsylvania in Jersey City. The Chancellor referred the case to Vice-Chancellor Reed, and testimony will be taken, pending which the work of tunneling must be suspended.

In the United States District Court at Milwaukee, Judge Seaman has filed his opinion in the suit of the United States against the Chicago, Milwaukee & St. Paul, in which the Government sought to collect a penalty of \$5,000 for alleged violation of law. The violation complained of was failing to comply with the provision ordering the filing of annual reports relative to certain purchased land grant roads. Judge Seaman holds that neither of the branch lines was a grantee of the United States in respect to the lands which were received in aid of construction, but that the grant was made directly from the State and not from the United States. An appeal will be taken.

The drought continues very severe in the valley of the Ohio River and its tributaries, and navigation seems from all accounts to be practically suspended. The local papers contain notices of passenger trains discontinued on account of the scarcity of water for locomotives. On the other hand, the railroads are getting large quantities of freight which ordinarily would go by water. The Ohio River Railroad and the Wheeling Division of the Pittsburgh, Cincinnati, Chicago & St. Louis are said to be doing the largest freight business in their history. A Pittsburgh paper states that there is 30,000 tons of track material on boats at that city which has been loaded and waiting since last April to be shipped to St. Louis and other western points. Large quantities of brick, tiles and other coarse freight are now being sent by railroad.

Electric Railroads in Canada.

Application is being made by the Canadian Electric Railway Co. for incorporation in Ontario to construct an electric road from Montreal to Windsor, via Kingston, Belleville, Brockville, Toronto and London, with power to build a branch line from Toronto to Niagara Suspension Bridge, and to build branch lines in other directions for a radius not exceeding 25 miles from any point on the main line.

Since the Canadian Pacific obtained its eastern entrance into Toronto by the way of the Don Valley, passengers for the North Toronto and Toronto Junction stations have been transferred at Leslie Junction to a street car that runs over the old tracks to Toronto Junction. This part of the line is seven miles in length and it is now proposed to convert it into an electric road.

A Trackman's View of Sand.

After pumping a handcar up a heavy grade over rails covered with a thick layer of sand a section foreman feels like getting a club and murdering the thick-skulled engineer that left such unmistakable evidence of his ignorance behind. Many engineers imagine that the more sand they use the less the drivers will slip. The result is the rail is covered with sand, the engine rumbles over it, every car drags heavily, and if the train gets over the hill it is done by main strength and awkwardness. Then when the trackmen come along they must get off and push or tire themselves out pumping the car up. It seems that not more than one engineer out of ten understands that a few grains of sand distributed along the rail a distance equal to the diameter of the drivers and at intervals of 500 or 600 ft. is sufficient to prevent slipping.—*Jerry Sullivan, in the Roadmaster.*

The Anthracite Coal Trade.

A further advance in prices at the Atlantic Seaboard is announced this week, the third increase since Sept. 23. The new rate is \$4.15 a ton f. o. b. for stove size and \$3.90 for egg and chestnut. The trade is reported active and the demand good. Cars are reported scarce and the drought of the past summer has restricted production. The publication of statistics of the output was suspended in July and the newspapers now find it very hard to get any accurate information as to the current production or the state of the stocks at the different points. There are capitalists who have representatives in the Boards of Directors of several different companies, but they will not divulge any information of value.

A Traveling Grocery.

An attack on an important institution maintained by the Plant System has been made at Orlando, Fla. Two employees in charge of the railroad "supply car" have been arrested on the charge of selling goods without licenses. The same complaint has been made in other communities at various times. From the railroad point of view the supply car combines benevolence with business, but the storekeepers of Orlando think it is an unwarranted interference with their legitimate traffic.

The supply car has been in use on the Louisville & Nashville system for years. It was introduced on the Plant lines by General Superintendent Dunham. The purpose of the car is to furnish the track lands with

supplies, saving them the necessity of losing time in going to market. It is stocked with everything that a laborer requires for his family, and goes over the road twice a month. The men are furnished whatever supplies they want at cost, with 10 per cent added to cover handling. They are not compelled to buy from the car, but it is almost universally patronized.

Experience has demonstrated that a large army of laborers can be kept very much better under proper discipline if they are furnished with whatever they may need in the way of supplies at their places of work. If the laborer goes to the neighboring towns to buy his supplies, he buys on credit, and very properly the merchant charges him a larger price than he would charge a customer who paid cash. The railway company does not run the car with the expectation of making any profit on the goods. The person in charge is authorized to furnish supplies to employees only.

The Plant System has in its employ about 1,500 track hands, and this large force keeps in safe condition the 2,000 miles of track. It is necessary that these laborers should be thoroughly disciplined and always at their posts. They are furnished homes, rent free, by the company on the line of road, and the company is now furnishing them supplies practically at cost. The advantages of the arrangement both to the company and the men are obvious.—*Florida Citizen, Jacksonville.*

Vermonters as Railroad Officers.

It is a coincidence worthy of note perhaps that Gen. J. G. McCullough, of Bennington, Vt., is the Receiver of the Erie Railroad; that Col. Aldace F. Walker, a Vermont born and bred, who studied law in the office of George F. Edmunds in this city, is the Receiver of the Atchison, and that Frank G. Bigelow, of Milwaukee, who has been appointed one of the receivers of the Northern Pacific Railroad, is a native Vermont. And all of them are men equal to and worthy of such great trusts.—*Burlington (Vt.) Free Press.*

The New Bridge Over the Danube.

The inauguration of the great bridge over the Danube took place, at Tchernavoda, on Sept. 26. This important work, one of the most remarkable achievements of the present century, has been completed within five years and a half, having been begun in 1890. The total cost amounts to about \$6,800,000. The structure consists of three viaducts and two bridges, properly so-called. The principal bridge crosses the main stream of the Danube at Tchernavoda, while the other spans an arm of the river called the Borcea am Fetesti. The two bridges are connected by a viaduct and an embankment running across the island Balta, which is submerged at high water. The two other viaducts form approaches to the main bridge from either side, and are rendered necessary by the height of the structure and by inundations to which the country on either side is liable. The superstructure of the bridges is of steel, with cantilevers resting on gigantic piers. The height of the principal bridge is 30 meters above high water level, thus leaving navigation free to the largest vessels. The height of the smaller bridge is 12 meters. The foundations are laid on piles driven to a depth of from 18 to 20 meters below the bed of the river. The viaducts are of masonry, their combined length being 2,870 meters, which, added to 750 meters, the length of the two bridges, gives a total length of 3,628 meters (11,900 ft.). In order to test the bridge, 15 large locomotives were coupled together and run across at high speed. The structure is exceptionally strong, special measure having been taken to resist the pressure of ice in the winter.

Accidents on Indian Railroads.

The *Times of India*, of July 26th, commenting on the annual return showing the number of persons killed or injured on the Indian railways, says that railway management in India may fairly be congratulated on the return just issued. The number of passengers carried was 145½ millions, and of this enormous total only one person was killed by accidents to trains, rolling stock, or permanent way, while 58 met their death by accidents from other causes, including their own carelessness or misconduct. During the same period 265 persons were injured, of whom 85 only were injured while traveling in trains. The proportion of passengers killed by accidents to trains to the number carried was thus 1 in 145,462,546, and the proportion injured 1 in 1,711,324, while the proportion of passengers killed from all causes was 1 in 2,465,467, and injured 1 in 548,915. Of railway servants the number killed (including those who met their deaths by their own carelessness or misconduct) was 193, and injured 531. Of other persons, not being either passengers or railway servants, 25 were killed at level crossings, 265 were killed while trespassing on the line, and 85 persons committed suicide. Eliminating the figures not relating to railway passengers, these figures compare very favorably with those for Great Britain, notwithstanding the increased developments which have taken place in recent years at home in signalling and appliances for stopping trains, and of the interlocking and block systems, &c. The last available figures relating to casualties on the home railways give a proportion of 1 killed to every 53,000,000 carried, and 1 injured to every 1,876,033 carried. The fatalities on the English railroads thus numbered very nearly three times the total of those on the Indian railroads, and this despite the fact that double-tracking is the exception on the Indian railways and the rule on those of England.—*The Practical Engineer.*

New Ferryboat for the Pennsylvania.

Mr. Lewis Nixon, manager of the Crescent shipyards at Elizabeth, N. J., has been awarded the contract for a steel ferryboat to be built for the Pennsylvania, for its service on the Delaware River between Camden, N. J., and Philadelphia. Her dimensions will be: Length over all, 168 ft.; beam, 38 ft.; beam over guards, 55 ft.; depth of hull, 14 ft. 8 in.

LOCOMOTIVE BUILDING.

The Ohio Southern has just ordered six locomotives from the Brooks Locomotive Works.

The Lehigh Valley has recently ordered from the Baldwin Locomotive Works 20 additional 10-wheel freight engines.

The Gulf & Interstate of Texas has ordered two locomotives from the Rhode Island Locomotive Works. The United States metallic packing, the Gollmar bell ringer and the reliable water gage were specified on these locomotives.

The Cleveland, Lorain & Wheeling has received a consignment of seven new heavy freight engines to be used in hauling heavy coal trains over the river division of the road, between Bellaire and Flushing, where there are several very heavy grades. The new engines haul 23 loaded coal cars with ease, where the old ones could only take 16 cars. The old engines are being fitted for yard work.

CAR BUILDING.

The Maine Central is asking bids on 1,000 new coal cars.

The Michigan Central will shortly order 1,000 new freight cars.

The Middletown Car Works of Arthur King have orders for 200 new gondolas for the Pennsylvania and 50 cars for a Mexican road.

The Norfolk & Western will shortly give out contracts for building 100 hopper gondola cars of 60,000 lbs. capacity, to be equipped with Westinghouse air brakes and automatic couplers.

The Toledo, Ann Arbor & Michigan has issued specifications for 725 cars. Twenty-five of these cars are to be large sized furniture cars, and the other 700 will be box cars of 60,000 lbs. capacity.

The Duluth, Missabe & Northern order for cars is likely to be 500 when finally given out. Sometime ago, as already announced, the company asked for bids on 200 new ore cars, but since the specifications were sent out it has been about decided to increase the order to 500 cars.

The Lehigh Valley has asked bids for the construction of 2,000 box cars for the Lehigh Valley road and for 50 platform cars for the Lehigh & New York road in New York state, formerly the Southern Central. The contracts for these cars will be given out this or next week.

The Cleveland, Lorain & Wheeling Railroad recently placed orders for 1,200 new gondolas to be used in the ore and coal trade, between Wheeling and the lake, and has now received the first consignment of 700 cars. They were loaded at Lorain with ore for Wheeling, and will carry coal back from the Wheeling mines.

The New York, New Haven & Hartford has given an order for 500 cars to the Michigan-Penninsular Car Co., in addition to the orders given to the Bradley Osgood Car Works, the Keith Manufacturing Co., and the Wason Manufacturing Co., as noted last week. The cars ordered are 60,000 lb. platform cars, and 60,000 lb. Pratt patent coal cars, and some of the cars are not to be delivered until May next. The Wason Company is to build 400 of the cars, and the Bradley Osgood Works and the Keith Manufacturing Co. will build 300 each.

BRIDGE BUILDING.

Bath, N. B.—Tenders are asked by the supervisor for building a bridge over the Gisguit stream, in the parish of Wicklow.

Bellaire, O.—The Bellaire & Benwood Bridge Co. has been organized to build a highway and electric street railroad bridge over the Ohio River between Bellaire and Benwood, W. Va. The incorporators are J. H. Reed, J. H. McCrady and George H. Brown, of Pittsburgh, Pa.; Charles Rosser, R. M. Gilleland and George W. Yost, of Bellaire. The surveys for the bridge have been completed, and the plans filed with the Government authorities. The structure is to have four river spans, with the channel span 550 ft., and the others about 200 ft. each. The bridge is built to connect the electric lines of Wheeling with those on the Ohio side. This bridge will give a continuous line of electric railroad about 20 miles in length. The new bridge will be within a few hundred feet of the Baltimore & Ohio Railroad bridge at Bellaire, and will make seven bridges over the Ohio within a distance of about seven miles.

Flesherton, Ont.—The Township Council of Artemesia is to build next spring two bridges, probably of steel, over the Saugen River and several small wooden bridges over minor streams.

Huntington, W. Va.—The County Court of Cabell County has ordered the erection of new bridges at Central City, over Four Pole Creek; over Russell's Creek near Jim's Run; at the mouth of Mud River, over Bat's Branch; at Blue Sulphur, and over Merritt's Creek. Two other bridges are building in the county. All are steel highway bridges averaging about 80 ft. in length.

Jersey City, N. J.—The contract for the 61 ft. span Melan bridge on Montgomery street, over Cornelison avenue, has been awarded to Messrs. Clark & Co., Brooklyn, N. Y., for \$10,250, the bridge to be completed in 45 working days.

New Martinsville, W. Va.—The County Court of Wetzel County has asked for bids for an iron or steel highway bridge to be placed over Big Fishing Creek, at the mouth of Bush Run, said bridge to be one span of 175 ft., and to have a clear roadway of 16 ft.

Ottawa, Ont.—A petition is being circulated asking the Minister of Railways and Canals to have a new bridge built across the canal at Bank street.

Pittsburgh, Pa.—The County Commissioners awarded contracts last week for building approaches to new bridge as follows: Bridge over Thompson's run, to James Peterson, Jr., \$150; Kilbuck run, to William Dickson, for \$135; Lewis' run, John Greenwald, \$73; Chartier's creek, W. H. Roberts, \$354; Campbell's run, W. C. Bryant, \$520; Thompson's run, John Kindland, \$100; Heath's run, William B. Finney, \$499; McLaughlin's run, John A. Englert, \$750.

Sioux City, Ia.—The first 500-ft. fixed span of the Pacific Short Line bridge across the Missouri River at Sioux City was completed last week. With the erection of this span, one-half of the iron work of the bridge superstructure is now completed. There yet remains another fixed span and the Nebraska draw span to erect. The last shipment of iron has been made from the works at Phenixville.

St. Louis.—The committee of the St. Louis Merchants' Exchange on Mississippi River Improvements, to which was referred a petition submitted to the Directors petitioning the City Council to submit an amendment to the City Charter authorizing special taxes to build a railroad bridge across the Mississippi River, and also a belt and terminal line in St. Louis and East St. Louis, have reported that the proposition is not feasible, and recommended that no action be taken thereon.

St. Thomas, Ont.—James A. Bell, City Engineer, is preparing plans for a new 60-ft. steel bridge to replace the bridge at Glencoln.

Toronto, Ont.—The City Engineer has approved of the plans for the overhead bridge at York street, and only a few preliminaries are now necessary to enable the work to proceed. It will be built by the Canadian Pacific.

Wheeling, W. Va.—The Canton Bridge Co., of Canton, Ohio, is erecting four new bridges for Ohio County, W. Va. The aggregate cost of them is about \$5,000.

Williamsport, Md.—A movement of citizens has been put on foot for building a bridge over the Potomac River between this city and Berkeley County, W. Va. It is estimated that the bridge will cost \$40,000.

Williamsport, Pa.—The County Commissioners opened bids Monday, for 156 ft. span, center to center of piers, 18 ft. center to center of trusses, and 22 ft. high, Pratt truss bridge, to be erected across the Muncy creek at Picture Rocks.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is said that a railroad which by its charter is declared to be a post route and military road, cannot make a valid contract with a telegraph company on the right of way not to furnish facilities for the construction of a competing line, and refuse to carry and distribute material for the construction of such line.¹

In Indiana it is ruled that it is the duty of a railroad which constructs its lines across a highway to restore it to its former state so far as possible.²

The Federal Court rules that the receiver of an insolvent railroad corporation should pay coupons of bonds, default in which would be likely to break up the system, in preference to coupons of bonds issued under a mortgage prior in date.³

In Pennsylvania it is laid down that where an incline railroad and a passenger railroad extend from the same point in different directions, the mere fact that the cars of neither road can run over the other road, and that passengers desiring to ride over both roads must change cars, does not prevent them from being "connected" within the meaning of the statute, which requires the railroads of lessors and lessees to be "connected."⁴

It is held by the Supreme Court of Tennessee that choses in action of a railroad corporation, coming into existence in the corporation's different divisions of the territory through which it runs, and going into a general fund, to be applied to dividends or general expenses, without regard to the division where such expenses are incurred, have their situs, for the purpose of taxation, at the corporate domicile.⁵

In West Virginia it is ruled that where a railroad company has put in, when building its road, a sufficient number of suitable farm crossings and cattle guards, it cannot be required afterwards to build others at other places.⁶

The Supreme Court of Missouri holds that a power granted to a railroad corporation, in its charter, to construct a railroad "from the city of H." to another point, authorizes it to build its road to or from any point in the city.⁷

In Michigan it is ruled that where an employer, in settling with an employee for injuries, agrees to employ him at a specified salary for life, or during his ability and disposition to perform the duties required, and afterwards discharges him without cause, such employee may recover prospective damages.⁸

In New Jersey it is held that where a railroad is proceeding in good faith with the construction of its road, with apparent ability to properly perform the work of crossing another railroad, it will not be restrained from so crossing merely because it has not yet secured a right of way over its entire route.⁹

The Supreme Court of the United States holds that a railroad may be liable as a carrier, though a receiver has been appointed for it, where he merely received a portion of the net earnings of that and other roads which are managed together, and permits it to be managed by its officers and employees in connection with those of the other roads.¹⁰

Injuries to Passengers, Employees and Strangers.

In Texas a train did not stop at the station long enough for plaintiff's wife to get off, but after it had again started, and when a short distance from the station, it slackened up for her to get off, without stopping. At the request of the brakeman, she jumped off while the train was moving, and was injured. It is held that she was not negligent.¹¹

In New York an action was dismissed on the following state of facts. The party on whose behalf the suit was brought was killed while crossing the tracks in defendant's yard, instead of leaving the train by the passageways constructed by defendant for the use of passengers. No necessity was shown for his taking that course, and defendant never invited or approved the use of any pathway across its tracks as a way of exit for passengers. The train by which he was struck was entering the yard at a rate of only three or four miles an hour, the headlight on the engine was lighted, and the bell was ringing.¹²

In Pennsylvania the Supreme Court rules that where a transfer check given to a passenger on leaving a street car has two punches—one correctly indicating the hour when issued and the other showing it to be two hours old—and the passenger takes the proper car immediately after receiving the check, the conductor has no right to treat the check as old, and ignore the correct time punched thereon, and the company is liable for the passenger's ejection.¹³

In the Federal Court a yard master took a passenger car and engine to give himself and fellow-servants a free ride, without authority or notice or permission from any officer who had authority to permit the passage of such a train. The Court rules that the company was not liable, as to a passenger, for injury to one on the train, though the engineer was paid for the time so spent as extra time, by direction of the master mechanic, who had no authority relative to the carrying of passengers.¹⁴

In Iowa it is not negligence, as a matter of law, for an engineer, in the proper operation of his train, to whistle "off brakes" when he knows a team is from 150 to 200 ft. from him on a highway, unless he knows or should know that it might frighten them.¹⁵

In the Federal Court it is held that a railroad owes no duty to one who has gone into its switching yard for purposes of curiosity merely, in violation of its rules, except to refrain from wanton or reckless injury to such person.¹⁶

In Massachusetts it appeared that deceased, a car inspector, was working at the end of a car, and that two box cars were on the track about 8 ft. from him. A car "kicked" from a train on a descending grade, without a brakeman, struck these two cars and caused them to collide with the car which deceased was inspecting. The box cars obstructed deceased's view of the approaching car. It was against rules of the company to "kick" the car off in the manner in which it had been done. The Supreme Court decides that it was error to direct a verdict for defendant.¹⁷

In Montana in an action by a section hand for injuries due to defects in a hand car on which he was riding, causing it to jump the track while crossing a bridge, it was shown that plaintiff knew of such defects, and informed his superiors, but continued to use the car on be-

ing told merely that request had been made for a new car, and being directed to use the one at hand with great care until the new one came. It was also shown that the car was obviously dangerous and that plaintiff had seen it run off the track when going at a much less rate of speed than it had acquired at the time of the accident. The Supreme Court holds that plaintiff could not recover.¹⁸

In Michigan it is held that a brakeman cannot recover for injuries received through being thrown in front of a moving train by stumbling over a pile of ashes wrongfully dumped between the rails by a fireman, and negligently allowed to remain there by the section men, in the absence of proof of notice, either actual or constructive, to the company, that the ashes were there.¹⁹

In Missouri it is laid down that railroad switchmen who, in violation of a rule of the company, habitually board moving switch engines from the middle of the track by stepping on the footboard of the engine as it approaches, assume the risks ordinarily incident thereto, but do not assume the danger of injury from incompetency of the engineer.²⁰

In the Federal Court a car inspector is not the fellow-servant of a brakeman,²¹ but in New York a conductor and fireman on different trains are.²² In Rhode Island a yard conductor and a fireman are not,²³ but in the Federal Courts they seem to be.²⁴ In Texas an engineer and a brakeman are not fellow servants.²⁵

In New York it is the duty of a railroad to furnish suitable cars for the transportation of goods, and therefore the act of loading iron rails on a car that is shorter than the rails is the act of the company, and not of the fellow-servants of a trainman who is injured by the ends of the rails projecting over the ends of the car.²⁷

In Kentucky, it is laid down that where a railroad allows two passenger cars to remain on a side track near its depot and along a public street, the doors of the cars being open, it is negligence to back other cars against them, for the purpose of coupling, without seeking to ascertain whether there are any persons in the cars, though no person had a right to be in such cars.²⁸

In Georgia it is ruled that the fact that plaintiff was intoxicated at the time of an injury resulting from defendant's negligence does not prevent his recovery, if the intoxication did not contribute to the accident.²⁹

In Texas it is held that where plaintiff was on defendant's engine by invitation, the act of the engineer in turning hot water upon him through a hose which the fireman had introduced into plaintiff's pocket without his knowledge whereby the latter was injured, was negligence for which the defendant is liable.³⁰

In Georgia where a railroad brakeman threw a stone at a boy attempting to board the train, and struck a child nearby, the company is not liable for the resulting injury, the act of the brakeman not being within his employment.³¹

¹ Mer. Trust Co. v. A. & P., 63 Fed. Rep., 910.

² L. S. & M. S. v. McIntosh, 38 N. E. Rep., 476.

³ Park v. N. Y., L. E. & W., 64 Fed. Rep., 190.

⁴ Pitts. & B. Traction Co., 30 Atl. Rep., 931.

⁵ State v. Tenn. C. I. & R., 29 S. W. Rep., 116.

⁶ Clarke v. O. R., 20 S. E. Rep., 694.

⁷ St. L., H. & K. C. v. Union Depot Co., 28 S. W. Rep., 483.

⁸ Brighton v. L. S. & M. S., 61 N. W. Rep., 550.

⁹ N. D. & N. J. J. C. Ry., v. P. R. R., 30 Atl. Rep., 1120.

¹⁰ P. R. R. v. Jones, 15 S. Ct., 136.

¹¹ Ft. W. & D. C. v. Viney, 30 S. W. Rep., 252.

¹² Parsons v. N. Y. C., 33 N. Y. Supp., 590.

¹³ Laird v. P. T. Co., 31 Atl. Rep., 51.

¹⁴ Ch., St. P., M. & O. v. Bryant, 65 Fed. Rep., 969.

¹⁵ Ochiltree v. C. & N. W., 62 N. W. Rep., 7.

¹⁶ K. C. Ft. S. & M. v. Cook, 66 Fed. Rep., 115.

¹⁷ Mears v. B. & M., 39 N. E. Rep., 997.

¹⁸ McAndrews v. Mont. U. Ry., 39 P., 85.

¹⁹ Loranger v. R. Co., 62 N. W. Rep., 137.

²⁰ Francis v. K. City, St. J. & C. B., 30 S. W. Rep., 123.

²¹ T. H. & I. v. Maubenger, 65 Fed. Rep., 196.

²² Herrington v. L. S. & M. S., 31 N. Y. S., 910.

²³ Parker v. N. Y. & N. E., 30 Atl. Rep., 849.

²⁴ Int. & G. v. Sepole, 29 S. W. Rep., 686.

²⁵ Martin v. C. & A., 65 Fed. Rep., 354.

²⁶ San A. & A. P. v. Bowles, 30 S. W. Rep., 89.

²⁷ Redington v. N. Y., O. & W., 32 N. Y. S., 535.

²⁸ L. & N. v. Popp, 27 S. W. Rep., 992.

²⁹ Cen. R. & B. Co. v. Phinazee, 21 S. E. Rep., 66.

³⁰ Int. & G. N. v. Cooper, 30 S. W. Rep., 470.

³¹ Georgia R. & B. Co. v. Wood, 21 S. E. Rep., 288.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Baltimore & Ohio, Washington Branch, 5 per cent., payable Nov. 1.

Boston & Maine, quarterly, \$1.50 per share on the common stock, payable Nov. 15.

Great Northern, quarterly, 1¼ per cent. on the preferred stock, payable Nov. 1.

Lake Erie & Western, quarterly, 1¼ per cent. on the preferred stock.

Nashville, Chattanooga & St. Louis, 1¼ per cent., payable Nov. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Ohio, annual, Baltimore, Md., Nov. 18.

Central Massachusetts, annual, Oct. 30.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 30.

Illinois Central, special, Chicago, Nov. 26 to authorize a capital of \$10,000,000 for the capital stock.

Manhattan Railway Company, annual, New York City, Nov. 13.

Newburgh, Dutchess & Connecticut, annual, Matteawan, N. Y., Oct. 31.

New Orleans & North Eastern, annual, New Orleans, Nov. 6.

St. Louis & San Francisco, annual, St. Louis, Mo., Oct. 29.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Westeyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Northwestern Railroad Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the Ho use of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Hanover, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2.30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

The Engineers' Club of Philadelphia.

At the regular meeting of the club, held on Saturday, Oct. 19, a discussion on the "Durability of Iron in Modern Building Construction" was opened by W. C. Furber. At the meeting on Oct. 5 President George S. Webster was in the chair and 74 members and visitors were present. Mr. John Birkinbine, Chairman of the Special Committee, read a memorial of Mr. Eckley Brinton Cox. Mr. William H. Dechant read a paper on the Submerged Pipe-line for the Pennsylvania Sanitary Sewerage Company, at Reading, Pa., describing the method of constructing the submerged pipe-line across the Schuylkill River at Reading. The width in this particular part of the river along the pipe-line is about 400 ft., and the deepest part about 10 ft. below extreme low water, the average depth being about 8 ft.

The President called attention to the series of practical talks on electricity which will be given at the Club House on the Saturday alternate with club meetings. Mr. Carl Hering opened the series, speaking on "Electrical Energy: Terms, Properties and Calculations."

Engineers' Club of St. Louis.

The club met Oct. 16, 22 members and six visitors present.

President Russell gave the results of some tests on bronze for tension and compression made by the Washington University testing laboratory for the St. Louis water-works extension. Tables of the results with charts and diagrams were shown. Messrs. Flad, Baier, A. L. and J. B. Johnson, Holman and Moore took part in the discussion. It was shown that the compressive strength of metals which flow could not be determined.

Mr. William H. Bryan then read a paper on Pamphlet Filing, explaining the difficulties he had met with in filing and indexing the many kinds of pamphlets which an engineer receives, and giving his solution of the problem, showing how all the data on any one of more than a hundred different subjects could be immediately located. Discussion followed by Messrs. Holman and Flad.

Mr. M. L. Holman then explained the break which occurred on Saturday, Sept. 12 in the dividing wall between two reservoirs at the Chain of Rocks. The water had broken down through the concrete bottom of a full reservoir, and up into the adjoining empty reservoir. The concrete foundation had been entirely washed away, but the wall itself was intact, leaving a span of nearly 60, and a depth of 15 ft. It was proposed to repair it by concrete foundation under the wall, and puddling work under the concrete bottom. Attention was called to the necessity of making provision for expansion and contraction of long masonry walls when built as monoliths. It was found in practice that walls which were perfectly tight in summer developed cracks of considerable area in winter. These were stopped by packing them with oakum dipped in cement, which required renewal every

winter. Messrs. Flad, Crosby, Johnson, Russell and Bryan participated in the discussion.

Western Railway Club.

The regular monthly meeting of the Western Railway Club was held at the Auditorium Hotel, Chicago, Tuesday, Oct. 15, at 2 o'clock. Owing to the absence of the President, Mr. G. L. Potter, the Vice-President, Mr. A. M. Waitt, presided. The meeting was an exceedingly interesting one, the paper for the day being "Wide Fire Boxes," by Mr. J. Snowden Bell. A motion was carried following out the suggestion made by Col. H. S. Haines at the banquet on Sept. 17. This was to the effect that an invitation be extended to the International Railway Congress to hold a meeting in Chicago previous to its next regular meeting at Paris in 1900. A suggestion was then made by Mr. F. A. Delano, of the Chicago, Burlington & Quincy Railroad, that it might be appropriate to hold an exhibition of railroad appliances at the same time. The Executive Committee of the Club was empowered to act on this.

The discussion of the paper on Compound Locomotive Tests on the Chicago & Northwestern Railroad, by Prof. Storm Bull, of the University of Wisconsin, was then held. It was the opinion of the members that although the tests had been carefully carried out, yet it was only by shop tests that an accurate comparison of the different locomotives could be made. In shop tests it is possible to get the same conditions and thus authoritatively decide on the value of different types in regard to economical working. The value of road test is confined to a direct comparison of the engines employed.

As an addition to the discussion of exhaust nozzles, begun at the last meeting by Mr. E. M. Herr, a short paper was presented by Prof. W. F. M. Goss, in which he described an apparatus devised by himself for determining the form of exhaust jets. This consists of two pipes with one end of each bent at a right angle to the pipe. This end is flattened somewhat and ground to a sharp edge. The two pipes are introduced into the opposite side of the smoke box. The sharpened ends being turned down, the exhaust jet strikes against them. The distance which the pipe is introduced is observed by a scale, and the pressure recorded by micrometer tubes.

The topical discussion preceding the intermission was on the standardizing of uncoupling devices for freight car couplers. It was the wish of several of the members to reach a decision on standard attachments, while others were in favor of strengthening the devices now used, it being thought that the danger of derailment by broken drawbars falling on the track would be lessened by making the uncoupling devices sufficiently strong to hold up the drawbar in case of a breakage of the strap or tail bolt.

After the intermission the paper on Wide Fire Boxes, by Mr. Bell, was presented. This was a very complete and exhaustive paper and contained the history of the development of fire boxes up to the present time. The discussion of this will be held at the next meeting.

PERSONAL.

—Mr. H. D. Gordon has resigned as master mechanic at the Juniata shops of the Pennsylvania, to take a position in New York as consulting engineer to a supply company.

—Mr. George P. Biles has been appointed General Freight Agent of the Cincinnati Southern to succeed Mr. H. F. Smith, the latter officer having resigned to go to the Southern Railway.

—Major Edward Fitzgerald, at present Assistant-General Freight Agent of the Western division of the Southern Railway, has resigned that office and has accepted another position, with headquarters at Louisville.

—Mr. O. L. Mitchell, heretofore Traveling Passenger Agent, at Birmingham, for the Alabama Great Southern, has been appointed Division Passenger Agent for the Cincinnati, New Orleans & Texas Pacific road with headquarters at Chattanooga.

—Mr. A. C. Tumey has been appointed Assistant General Freight Agent of the Louisville, New Albany & Chicago, with headquarters in Chicago, and W. H. Newman has been appointed Division Freight Agent of the same company at Louisville.

—Mr. H. B. Hodges, who recently resigned the position of Engineer of Tests of the Baltimore & Ohio, has been appointed Superintendent of Tests of the Southern Railway. He has complete charge of all tests and inspection and his headquarters are in Washington, D. C.

—Mr. A. W. Swanitz, Chief Engineer of the New Orleans & Western, has been appointed its General Manager. Since the beginning of the construction of the road Mr. Swanitz has been virtually General Manager, having the entire work under his immediate charge.

—Colonel H. S. Haines was formally elected Chairman of the new Southern States Freight Association at the meeting in New York on Thursday of last week. Colonel Haines, as all railroad men know, was until recently Vice-President of the Plant System, and is the President of the American Railway Association.

—Captain William Hawn, until recently Assistant Auditor of the Southern Railway, with headquarters at Knoxville, has resigned that office, having been appointed Auditor of the new Central of Georgia Company. Mr. L. F. Cunningham, the present Auditor, will continue in charge of the receiver's accounts.

—Mr. R. H. Chamberlain, for more than 40 years connected with the Chicago, Rock Island & Pacific and for over 15 years Superintendent of its Chicago division, died last week at Chicago at the age of 69 years. For the last three or four years Mr. Chamberlain has been in failing health and has acted in an advisory capacity.

—Mr. Henry Wood, formerly General Superintendent of the Little Rock & Fort Smith road, has been appointed Acting General Manager of the Choctaw, Oklahoma & Gulf road, with headquarters at South McAlester, I. T. He has recently been in charge of the operation of the South Jersey road, of which President Gowen, of the Oklahoma road, is Receiver.

—Mr. Frederic von Emperger, Consulting Engineer, who has had an office at 71 Broadway, New York City, for a year or so past, and has introduced the Melan system of iron and concrete construction for bridges, sailed for Europe on the City of New York, on Oct. 23, to take charge of his Vienna office. His New York office will be conducted as heretofore as a consulting office under the name of the Melan Arch Construction Co., in charge of his assistant, Mr. William Mueser.

—Mr. Joseph Ramsey, Jr., has been appointed General Manager of the Wabash, succeeding Mr. Hays, who goes to the Grand Trunk. Mr. Ramsey is now General Manager of the Terminal Railroad Association of St. Louis. He will enter upon his new duties on Jan. 1 next. He

has been with the Terminal Company since 1893, going to it from the "Big Four," of which he had been General Manager for about two years. Before 1890 he was Chief Engineer of the Cincinnati, Hamilton & Dayton. He resigned that office to become Assistant to President Ingalls, of the Big Four.

—Mr. Edward W. McKenna, General Superintendent of the Great Northern road has resigned that position, and will leave its service on Nov. 1, to give his entire attention to the interests of the Pioneer Rail Renewing Co., which has offices in the Rookery Building, Chicago, and of which Mr. McKenna is President. He is the inventor of the process of that company for re-rolling steel rails, which has been described in these columns. Mr. McKenna has never before been engaged in any other work than railroading, and he has been in that service continuously since 1862, beginning work before he was 15 years old. He was for a number of years telegraph operator on Western roads, and then became superintendent of several divisions of the Pennsylvania in Indiana. He was afterward on the Erie for a short time, in the General Manager's office, but in 1887 became Division Superintendent of the Chicago, Milwaukee & St. Paul. In 1890 he was made Assistant General Superintendent of that company and not long ago he went to the Great Northern as General Superintendent.

—Mr. Harvey M. Littell, the newly-elected President of the American Street Railway Association, is General Manager of the Atlantic Avenue Railroad Co., of Brooklyn. He was elected to this office early this year after the resignation of Mr. Benjamin Norton. He had been previously General Manager of the New Orleans Traction Co. Immediately after completing this work he was transferred to Brooklyn, as stated above, the owners of the New Orleans road having then acquired a controlling interest in the Brooklyn Company. Mr. Littell has had an extensive experience both in street railroad and in steam railroad service, and he has superintended the reconstruction of street lines for electric traction in St. Paul, Cincinnati and New Orleans. He was with the St. Paul City Railroad as General Manager between 1883 and 1885, having previously been with the Louisville & Nashville road. He again entered steam railroad service in the latter year as General Freight and Passenger Agent of the Chicago, St. Paul & Kansas City road. In 1888 he was at Cincinnati, and in January, 1893, he went to New Orleans to reconstruct and extend the street railroads of that city operating 120 miles.

—Mr. J. A. Fillmore, long General Superintendent of the Central Pacific, becomes Manager of the Pacific System of that company under the revised organization just announced by President Huntington and General Manager Kruttschnitt. He has been General Superintendent of the company since 1882, and has been in its service over 30 years, going to the Central Pacific as Superintendent while it was under construction. The Southern Pacific's present organization provides for a General Manager, having authority over all the lines of the company, as before announced. The three divisions into which the road has heretofore been divided are retained, the officer in charge of each division being now termed Manager. Mr. W. G. Van Vleck holding that position for the Atlantic System, Mr. Fillmore for the Pacific System and Mr. Richard Koehler for the Oregon Lines. The latter has held the title for a long time and is now given additional responsibilities. The roadway will be in charge of Engineers of Maintenance of Way, Mr. J. I. Mahl holding this office for the Atlantic Lines and Mr. W. G. Curtis for the Pacific and Oregon Lines. In matters of general policy these officers report to the General Manager direct, otherwise acting with the system managers. Mr. H. J. Small continues as Superintendent of Motive Power of the Pacific System and the Oregon Lines, and the same office has been created on the Atlantic System, Mr. J. J. Ryan, formerly Master Mechanic, being promoted to this office.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—The appointment of E. Schuyler, as Division Freight Agent at Birmingham, Ala., is announced. He succeeds T. F. Steele, resigned.

Bangor & Aroostook.—The annual meeting was held at Bangor, Me., Oct. 16. The following officers were elected: President, Albert A. Burleigh; Vice-President and General Manager, F. W. Cram; Treasurer, Edward Stetson; Clerk, F. H. Appleton, and Directors, A. A. Burleigh, F. W. Cram, C. A. Gibson, Edward Stetson, B. B. Thatcher, F. H. Appleton, John F. Colby. Aroostook County Directors, T. H. Phair, of Presque Isle; R. W. Shaw, of Houlton; Daniel Lewis, of Sherman.

Central of Georgia.—A temporary Board of Directors has been elected by the stockholders of the reorganized company, with Gen. Samuel Thomas, of New York, as Chairman. The permanent board will be elected in about 10 days, and a President will probably be chosen at the same time. R. S. Anderson has been chosen Vice-President, Henry Crawford, General Counsel, and W. A. C. Ewen, Treasurer.

Chesapeake & Ohio.—Stockholders of the company elected Directors as follows at the annual meeting at Richmond, Va., Oct. 22: William P. Anderson, Westley, R. L.; Decatur Axtel, Richmond, Va.; George T. Bliss, New York; C. H. Coster, New York; Chauncey M. Depew, New York; Charles D. Dickey, Jr., New York; M. E. Ingalls, Cincinnati; Samuel Spencer, New York and Henry T. Wickham, Richmond, Va.

Chicago, Peoria & St. Louis.—The following changes are announced: Trainmaster H. S. Reardon, promoted to be Superintendent to succeed F. L. Thompson, resigned; C. H. Landon, promoted from Assistant Chief Engineer to be Superintendent of Maintenance of Way.

Cumberland & Pennsylvania.—The annual meeting of the stockholders was held at Cumberland, Md., on Thursday last. The following directors and officers were elected: W. F. Frick, James Sloan, Jr., William P. Harvey, Charles F. Mayer and William H. Blackford; President, Charles F. Mayer; Secretary, P. K. Stewart.

Denver & Rio Grande.—The Board of Directors elected last week is as follows: George Coppel, Chairman; R. T. Wilson, J. L. Welsh, C. C. Beaman, William Mertens, E. T. Jeffery, E. O. Wolcott, Arthur Coppel and Albert Crotius.

Georgia Southern & Florida.—At the recent annual meeting in Macon, Ga., directors were elected as follows: Samuel Spencer, of New York; A. B. Andrews, of Raleigh, N. C.; Wm. Checkley Shaw, Shipwith Wilmer, Thos. B. Grisham, John Gill and Charles D. Fisher, of Baltimore; George W. Parrott, of Atlanta; H. P. Smart, of Savannah; J. F. Hanson, Maurice Happ, Benjamin C. Smith, T. D. Tinsley, Charles L. Bartlett and William H. Felton, Jr., of Macon.

Illinois Central.—The annual meeting was held at Chicago, in Oct. 16. The terms of Stuyvesant Fish, Edward J. Harriman, and John Jacob Astor expired, and they were re-elected on the Board of Directors.

Indianapolis Belt.—John H. Holliday has been elected Secretary and Director of the Belt Railroad and Stock Yard Company. He succeeds R. S. McKee, resigned.

Louisville, Evansville & St. Louis.—The annual meeting of the stockholders was held at Belleville, Ill., Oct. 18, and the following Board of Directors was elected: Charles S. Fairchild, Joseph Stillman, George P. Heilmann, William Burr, Thomas Barret, Mayer Lehman, W. T. Bull, E. O. Hopkins.

Maine Central.—The stockholders at their annual meeting at Portland, Me., Oct. 16, chose the following Board of Directors: Franklin A. Wilson, Bangor, Me.; Payson Tucker, Portland; Lucius Tuttle, Boston; Samuel C. Lawrence, Medford, Mass.; George M. Pullman, Chicago; William G. Davis, Portland; Joseph S. Ricker, Deering, Me.; L. C. Ledyard, New York; Henry M. Whitney, Boston; Henry H. Reed, Boston; Thomas W. Hyde, Bath, Me.; John Ware, Waterville, Me.; Francis W. Hill, Exeter, N. H. Franklin A. Wilson was re-elected President; Payson Tucker, Vice-President and General Manager, and Josiah H. Drummond, Clerk.

New York, New Haven & Hartford.—The annual meeting was held in New Haven, Conn., Oct. 16. The election of directors resulted in the re-election of the old board, as follows: William D. Bishop, Bridgeport; Henry C. Robinson, Hartford; Charles P. Clark, New Haven; Joseph Park, Chaucery, Me.; William Rockefeller, J. Pierpont Morgan, George M. Miller, New York; Leverett Brainard, Hartford; John M. Hall, New Haven; Charles F. Choate, and Nathaniel Miller, Boston; Royal C. Taft, Providence; Charles F. Brooker, Torrington; Carlos French, Seymour; George J. Brush, Arthur D. Osborne, New Haven; I. Dever Warner, Bridgeport, and H. S. Lee, Springfield, Mass.

Pullman's Palace Car Co.—The annual meeting of the stockholders was held at Chicago on Oct. 17. Directors George M. Pullman, Marshall Field, J. W. Doane, Norman Williams and O. S. A. Sprague, of Chicago, Henry C. Hulbert, of New York, and Henry R. Reed, of Boston, were re-elected.

Southern.—The old Board of Directors was re-elected at the annual meeting of the company in Richmond, Va., on Oct. 22, as follows: A. B. Andrews, A. L. Boulware, C. H. Coster, H. C. Fahnestock, T. F. Ryan, Samuel Spencer, A. J. Thomas, Samuel Thomas, and Skipwith Wilmer.

Southern Pacific.—General Manager Kruttschnitt has issued the following circular, under date of Oct. 11, announcing changes in the organization of the company: In accordance with instructions received from the president, the operations of the Transportation Department of the company's lines will be conducted as follows: Lines in Oregon, under the management of Mr. Richard Koehler, Manager, with headquarters at Portland, Ore.; Pacific system lines, under the management of Mr. J. A. Fillmore, Manager, with headquarters at San Francisco, Cal.; Atlantic system lines, under the management of Mr. W. G. Van Vleck, Manager, with headquarters at Houston, Tex. The above officers will be held responsible for the efficient and economical management of the property in their charge, and shall exercise on their respective systems the same authority as is exercised by the General Manager over the entire property.

The Maintenance of Way Department of the Oregon lines and of the Pacific system will be under Mr. W. G. Curtis, Engineer Maintenance of Way, with headquarters at San Francisco, Cal. Mr. Curtis, in addition to the duties pertaining to this office, will attend to such duties for the General Manager as may from time to time be assigned him. The Maintenance of Way Department, Atlantic system, will be under Mr. J. T. Mahl, Engineer Maintenance of Way, with headquarters at Houston, Tex. The Motive Power Department of the Oregon lines and of the Pacific system will be under H. J. Small, Superintendent of Motive Power, with headquarters at Sacramento, Cal. The Motive Power Department of the Atlantic system will be under Mr. J. J. Ryan, Superintendent of Motive Power, with headquarters at Houston, Tex.

The heads of the Maintenance of Way and Motive Power Departments will, in matters of detail, act with the managers of the respective systems, but in matters pertaining to common standards, or general policy, will report to the General Manager direct.

Wabash.—Joseph Ramsey, Jr., has been appointed to the position of General Manager, made vacant by the resignation of Mr. Hays. Mr. Ramsey will assume his new duties about Jan. 1.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Alabama Northern.—Articles of incorporation of this company were filed in Alabama last week. The road is to extend from Florence, Ala., northward to the state line. G. P. Jones, R. J. Simpson and R. T. Simpson, Jr., all of Florence, are the incorporators.

Aransas Pass Terminal.—Contracts for the construction of this terminal railroad from the City of Aransas Pass to and across Harbor Island, a distance of about seven miles, will be awarded within a few weeks.

Canadian Roads.—A company has been formed of residents in Leeds, Inverness, Broughton and St. Sylvester, to build a road passing through the counties of Beauce, Megantic and Lotbiniere. The line will start from a point on the Quebec Central to the Township of Broughton, passing through the townships of Leeds and the Harvey Hill copper mines, along Palmer River and through the township of Nelson to Lysle.

Central of New Jersey.—It is said the Central Railroad of New Jersey has decided to build a branch road from Bound Brook to Chimney Rock, N. J., about six miles, in order to secure the business of the stone quarries and of a good fruit section of New Jersey. Work will be begun at once.

Cincinnati, Jackson & Mackinaw.—George M. Huss & Co., of the Rookery Building, Chicago, who were awarded the contract for building the Cincinnati & Jackson, have about 20 men on the construction work at present. This road is the Jackson extension of the above company and will be about 18 miles long from A. Idson, the present northern terminus of the Cincinnati, Jackson & Mackinaw, into Jackson, the capital of Michigan. The road has been surveyed via Woodstock and Clark's Lake, and, as before stated, all the right of way, except one or two small pieces of land, has been secured. The locating surveys were made some months ago, and there is apparently nothing to delay the con-

tractors. The principal bridge work on the line is a timber structure 1,200 ft. long and 23 ft. high. Otherwise the work is heavy earth grading. The address of the contractors while on the work will be Woodstock, Mich.

Denver & Colorado Southern.—This company, recently incorporated in Denver, is to build another new line into Cripple Creek. The new route will require but 32 miles of new track to complete a line from Denver direct to Cripple Creek over easier grades than the Midland and about 60 miles shorter. The plan contemplates trackage arrangements with the Denver, Leadville & Gunnison, which would have to be widened to standard gage as far as Symes. Thence the new line will be constructed up the Trout Creek, through South Park to Divide station on the Midland, where connection would be made with the Midland Terminal into Cripple Creek. This would give a connection through the Florence & Cripple Creek road with the coal and oil fields about Florence & Canon. The enterprise is understood to be promoted by D. G. Moffatt, of Denver, formerly President of the Denver & Rio Grande.

Leroy & Northern.—An adjourned hearing on an application of the company for authority to construct its proposed road, was held before the New York Railroad Commissioners this week. Attorneys for the Erie Road and Mr. Edgar Van Etten, General Superintendent of the New York Central road, opposed the application, decision upon which was reserved.

Midland Terminal.—This company has brought suit in the district court to compel the town of Victor, Col., to give the company the right of way through the town as originally agreed upon. The town, it is alleged, failed to keep its contract for right of way through Granite street.

Mount Washington.—The directors have voted to rebuild immediately the engine house, station, repair shop and other buildings destroyed by fire last spring. The travel during the past season is reported to have been greater than for many years.

Nevada & Eldorado.—Chief Engineer H. A. Wood has filed maps of the proposed road. The line parallels the Missouri, Kansas & Texas out of Nevada, Mo., for a distance of three miles, when it goes due east to Eldorado Springs. The engineers are now at work on the Eldorado end of the line. The road will be about 22 miles long.

New Roads.—Track laying on the new road between Opelika and Lafayette, Ala., 22 miles, has begun. The grading has been completed for about four miles, and is being rapidly pushed. An engine and cars will arrive during the week. The new road will be a competitor of the Central of Georgia.

New York & Pennsylvania.—The New York State Railroad Commissioners gave an adjourned hearing at Albany, on Oct. 22, on the application of the railroad, which is to extend from Hornellsville to the northern part of Pennsylvania, for permission to construct its line. Attorneys representing the Erie Railroad Company opposed the application. Decision was reserved.

Patten & Sherman.—Work on this road is being pushed forward rapidly, and it is expected that the work of grading will be completed by Nov. 1. It is a branch of the Bangor & Aroostook, six miles long, from the Ashland branch of that company to Patten.

Pennsylvania.—Charles McFadden, Jr., of Philadelphia, has been awarded the contract by the Pennsylvania for completing the first division of the new Bustleton branch. This extends from its junction with the New York division, a short distance above North Penn Junction, for a distance of 3½ miles, and takes in all of the branch that the company proposes to build at this time. Mr. McFadden was the lowest of ten bidders, and the original contract for the construction of the branch was awarded to his father, now deceased, who was engaged on the work when construction was suspended. Other bidders were Kennedy Crossan, J. W. Hoffman & Co., John A. Kelley, E. C. Wells, D. F. Keenan, John T. Dyer, Charles A. Sims & Co. and P. McManus.

Pennsylvania Midland.—Work has again been discontinued on this new line in Bedford, Blair and Somerset counties, Pa. Operations may not be resumed until next spring.

Southwestern.—A meeting of the provincial directors of the company, recently granted a charter by the Provincial Government to build a road from Caughnawaga to Valleyfield, was held in Montreal last week, at which the charter was transferred to Dr. Seward Webb, representing the Adirondack & St. Lawrence road. The work of constructing the road will be commenced at once, as it is proposed to have it completed not later than July of next year.

Ulster & Delaware.—The short extension of this road north of Kingston to Rondout, N. Y., on the Hudson River, is now nearly all under contract, and the work is to begin this week. This extension is only about a mile long, but the contract includes large docks at Rondout to provide for the landing of the Albany day boats on the Hudson River at Rondout. Heretofore these boats have had a landing at Rhinecliff, on the opposite side of the Hudson River, and the passengers for the Catskill regions have had to cross the river to reach the Ulster & Delaware station by a ferryboat, making two transfers of baggage. With the new facilities passengers by the steamers will reach the railroad cars directly.

Virginia.—This is the new name for the proposed Columbus, Huntington & Guyandotte River road, decided upon at a meeting of the directors at Huntington, Oct. 18. These new officers were elected: C. W. Smith, of Chicago, President; Robert Avery, 47 Broadway, New York, Secretary and Treasurer, and C. W. Campbell, Huntington, as Assistant Secretary and Treasurer. Construction work on the road, the Directors say, will commence at once.

Wheeling & Connellsville.—A meeting of the stockholders of the old company will be called to meet in Wheeling, W. Va., this month, to consider the plans submitted by the Wheeling Chamber of Commerce for putting the enterprise under early construction. The Chamber of Commerce has raised funds for all preliminaries. The plan favored for raising the \$800,000 necessary is to secure subscriptions from the Wheeling business men and Ohio County, W. Va., Marshall, Fayette and Greene counties, Pa., the towns of Waynesburg and Uniontown, and the coal and coke producers of Fayette County. Free right of way was assured several years ago. Three routes were then surveyed carefully by engineers under Mr. Gilmore Brown. One of these routes will be selected and the final location made. These routes are the Middle Wheeling Creek route to Connellsville, 75 miles; Big Wheeling Creek route, 60 miles; Southern route, 80. Few tunnels would be needed on any

of the routes, the Big Wheeling Creek route requiring but one, though many small bridges will be necessary. All these plans contemplate the use of the Wheeling Bridge & Terminal Company's terminals in Wheeling, and a Western outlet by way of this company's Ohio River bridge and the Wheeling & Lake Erie and the Cleveland, Lorain & Wheeling.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—It is announced that the foreclosure sale will take place at Topeka, Kan., on Dec. 10, under a recent order of Judge Caldwell, of the United States Court.

The reorganization committee has received the assessment of \$10 per share on 1,011,679 shares out of a capital stock of 1,020,000 shares, leaving a few more than 8,000 shares outstanding. The committee, however, expect to receive the assessment on 7,000 out of the remaining 8,000, and possibly on all of them. The total amount of cash, therefore, received by the committee for assessments is \$10,116,790. Of that sum \$3,395,920 was paid in in Europe on stock held there (London and Amsterdam). The balance of the stock (672,087 shares) was held in Boston and in New York, a slight majority being held in the latter city.

Baltimore & Ohio.—The earnings and expenses for the three months from July 1 to Sept. 30, 1895, were announced last week as follows: Earnings, \$6,271,714; expenses, \$4,307,164; net increase as compared with the same months of 1894, \$10,582. The net earnings for the twelve months ended June 30, 1895, applicable to a dividend upon the common stock, amounted to over 2½ per cent. after the deduction of all charges of every description, including dividends upon preferred stocks, cash sinking funds and car trusts. The directors, however, have decided to not declare a dividend upon the common capital stock at this time. The customary semi-annual dividend of five per cent. on the stock of the Washington branch for the six months ended Sept. 30, 1895, was declared. This is the second time this year that the dividend on the common stock has been passed.

Bangor & Aroostook.—The pamphlet report for the year ending June 30 shows 272 miles operated, an increase of 73 miles. The new lines from Houlton to Caribou (60 miles) and Fort Fairfield Junction to Fort Fairfield (13 miles) account for the increased mileage. The capital stock is \$1,867,500; bonded debt outstanding, \$2,688,000; interest paid, \$14,800. The road has cost \$4,483,142, or \$21,685 per mile. Earnings show: Gross, \$582,832; expenses, \$381,540; net, \$201,292; balance, after charges, \$51,900 against a deficit of \$47,356. The surplus is now \$18,756. Passengers carried were 194,574, and freight carried 257,609 tons. The road owns 25 locomotives, 9 being added during the year.

Cape Fear & Yadkin Valley.—Two committees of bondholders have been organized to undertake the reorganization of this property, one committee having headquarters in Baltimore, asking deposits from all the bondholders of the company, the other being formed in New York to look after the interests of the Division A bondholders. There is a good deal of speculation as to whether these respective committees are not supported by the Baltimore & Ohio and the Southern Railway. It is said that the New York committee will shortly apply to Judge Simonton in the United States Circuit Court, asking for a decree for the sale of the division from Greensborough via Fayetteville to the South Carolina State line. The committee says that more than a majority of the bonds issued on the first division of the road have been deposited with it. This motion, if made, will be opposed by the Baltimore committee of bondholders who propose to reorganize the property as a whole. The bonds are in three series, the different issues being authorized as the different divisions of the road were built and put in operation. The A bonds are a first mortgage on the line to Fayetteville, the B bonds of the line from Greensborough to Mt. Airy, N. C. and the C bonds on the line between Fayetteville and Wilmington, N. C. The line extends across the State of North Carolina from Mt. Airy in the Blue Ridge Mountains via Greensborough and Fayetteville to Wilmington on the Atlantic Coast, the company operating about 325 miles of road. Lately there has been a good deal of talk that the Baltimore & Ohio might purchase the property at the foreclosure sale. To make this plan worth any consideration at all, it is necessary to assume that the Roanoke & Southern road, extending from Roanoke, Va., to Winston, N. C., 102 miles, will also be purchased by the Baltimore & Ohio. That line some years ago was leased by the Norfolk & Western, but since the receivership of the latter company the bondholders have organized a committee for the independent reorganization of that property, and that committee controls practically all of the company's securities. If the Baltimore & Ohio leased that line it would still be necessary to build a short line from Lexington into Roanoke. Then a continuous line would be formed from Lexington, Va., across North Carolina to Wilmington, connecting at three points with the Southern Railway, at two with the Atlantic Coast Line and also at two points with the Seaboard Air Line. Some foundation for this talk was found in the recent visit of certain officers of the Baltimore & Ohio and Gen. John Gill, of Baltimore, the receiver of the Cape Fear & Yadkin Valley and President of the Mercantile Trust Co., of Baltimore, which is interested in the reorganization. The New York committee, which represents only the bonds between Greensborough and Fayetteville, is said to desire the separate reorganization of the different divisions of the property. The Southern Railway, it is thought, would then purchase the division between Fayetteville and Greensborough.

Central of Georgia.—The sale of this property at foreclosure at Savannah recently has been confirmed by Judge Pardee in the U. S. Circuit Court at Atlanta. The sale of the Savannah & Western, which is operated by the Central of Georgia and which property was sold a few days before the Central of Georgia sale, was also confirmed at the same time. Both roads were purchased for the Thomas and Ryan Reorganization Committee of the Central of Georgia.

Central Washington.—Judge Hanford, of the United States Circuit Court, at Spokane, Wash., last week authorized Receiver Chamberlain to cancel on Nov. 30 the lease under which the road is now operated by the Northern Pacific, and to enter into negotiations with Receiver Burleigh, of the Northern Pacific, for a new lease of the road upon equitable terms. Failing to make such a lease he is to open negotiations to lease the necessary rolling stock to operate the road independently. This line is located in the great wheat growing section of Eastern Washington.

Chicago & West Michigan.—The Treasurer of the company announces that the net earnings of the company are insufficient to pay the coupons due on Nov. 1 and Dec. 1 and for the third time the bondholders are

asked to accept one-half in cash and one-half in scrip for the interest on their bonds. The scrip is to be payable in 10 years with interest at five per cent.

Cleveland, Lorain & Wheeling.—J. W. Davis & Co., bankers of New York, last week offered for sale 15,000 shares of this company's preferred stock, and the issue was over-subscribed. M. D. Woodford, President of the company, prepared a statement showing that the gross earnings of the road for the year ending June 30 last were \$1,360,464, leaving, after deduction of operating expenses, net earnings of \$401,428, and, after payment of the entire yearly interest charges, a surplus of \$202,428. A statement for the quarter ending Oct. 1 last shows, after deduction of operating expenses, interest on bonds and all taxes, a balance to credit of income of \$64,713. President Woodford adds that "it is the aim of the management to place the stock in the list of permanent dividend payers, the present earnings warranting the payment of dividends during the current fiscal year at the rate of 4 per cent., besides the expectation of a considerable surplus to be used in the way of betterment."

Columbus, Sandusky & Hocking.—This property was purchased at foreclosure sale by representatives of the Bondholders' Committee for \$1,500,000 at Columbus, O., on Oct. 19. The only bids offered were by representatives of the Bondholders' Committee. It will be remembered that when the railroad was first offered for sale under foreclosure proceedings some weeks ago the Bondholders' Committee, on account of opposition bidding, had to bid in the property for about \$4,000,000. The Court, on application of the Bondholders' Committee, afterward set aside the sale on the ground that the opposition bidding represented no responsible interest.

Evansville & Terre Haute.—The company reports its earnings for the year ending June 30, as follows:

	1895.	1894.	Inc. or dec.
Gross earn.....	\$1,345,022	\$1,102,629	I. \$242,393
Oper. exp.....	787,976	575,093	I. 212,883
Net earn.....	\$557,046	\$527,536	I. \$29,510
Other income.....		44,056	D. 44,056
Total.....	\$557,046	\$571,592	D. \$14,546
Fixed charges.....	570,952	419,126	I. 151,826
Deficit.....	\$13,906 (Surp.)	\$152,566	I. \$166,472

President Barlow says: "The policy of permanently improving the company, which was begun two years ago, has been carried on during the last year. Equipment notes to the amount of \$154,121 have been paid during the year, leaving amount outstanding \$214,121, to be provided for during the next five years in annual payments. The complication arising under the alleged guarantee by the company of the principal and interest of Evansville & Richmond bonds is in process of adjustment. During January a settlement was arranged with a large majority of the Richmond bondholders. Under this agreement over \$1,200,000 in bonds have been exchanged for preferred stock. The result from the operation of the Evansville & Indianapolis road has been disappointing, owing chiefly to the impossibility of placing the output of coal as against the cheaper quality, which has substantially driven block coal out of the market of the Northwest freight business."

Gadsden & Attalla Union.—The trustees of this road are to sell the property to the highest bidder at Gadsden, Ala., on Dec. 11. The road is about 11½ miles long, extending from the station of the Queen & Crescent Lines at Gadsden to Attalla on the Tennessee River.

Green Bay, Winona & St. Paul.—The organization plan has been declared operative, as the holders of a large majority of the income bonds, preferred stock and common stock have assented to the plan. Until Oct. 30, securities will be received by the committee, of which Mr. John I. Waterbury is the chairman, only upon the payment of a penalty of ¼ per cent. of the par value of the securities in addition to the assessments fixed by the plan.

Monterey & Mexican Gulf.—The Belgian interests in this property, which control a large majority of the bonds, have assumed the operation of the property, appointing Mr. Arthur Monnom the Resident Agent in Mexico. The road has been operated for several years past by Mr. J. A. Robertson as Receiver and General Manager. The transfer to the bondholders, which has been expected since the reorganization of this property, has just been made. The new officers of the company were published last week.

Nevada Southern.—This property was sold at San Bernardino, Cal., last week, by the Sheriff, under a decree of the California Superior Court, to K. B. Anderson. Judgments had been rendered by decree for \$151,709. The amount bid was \$153,966. It is understood that the purchaser will transfer the property to the California & Eastern, which has been organized to succeed the present company, and extend the line now in operation to the mines at Good Springs, Nev.

New York, New Haven & Hartford.—President Clark made an address at the annual meeting last week, explaining the financial condition of the company. He said that the company's earnings for the months of July and August, actual, and September, estimated, were \$1,000,000 greater than for the same period last year. For this period the amount to be applied to the payment of dividends would approximate \$400,000. The act of the Rhode Island State Legislature giving the road power to acquire the stock of the Stonington Steamboat Co. and the act of the Connecticut Legislature, allowing the road to absorb the Tomlinson Bridge Co. and Union Wharf Company, in New Haven, were accepted by the stockholders.

Pullman Palace Car Co.—The company reports its earnings for the fiscal year ending July 31 as follows:

	1895.	1894.	1893.
Gross earn.....	\$8,447,624	\$9,595,067	\$11,383,896
Oper. exp.....	3,511,029	3,497,298	3,825,940
Net earn.....	\$5,036,595	\$5,096,769	\$7,557,956
Prop. expense to gross.....	4174	3094	5394
Paid other costs.....	746,204	897,552	1,037,508
Dividends.....	2,880,000	2,880,000	2,520,000
Total charges.....	\$3,636,204	\$3,777,352	\$3,556,508
Surplus.....	1,410,391	2,320,417	4,006,448

Tennessee Midland.—The road was sold under an order of the United States Circuit Court at Memphis, Oct. 17, in a suit brought by the St. Louis Trust Co. for foreclosure under the first mortgage bonds. The property was bought in by J. W. Phillips, of St. Louis, on behalf of the Trust Company, at the upset price of \$1,000,000. This was the only bid.

Port Royal & Western North Carolina.—The postponed sale of this property is to be held at Greenwood, S. C., on Nov. 20, Judge Simonson, in the United States Circuit Court in South Carolina, having adjourned the

sale from Oct. 17 to that date. This road is one of the lines formerly operated by the Central of Georgia, but some time after receivers were appointed for the latter property the security holders of this company secured the appointment of a separate receiver, and since then the operation of the line has been independent of the Central of Georgia. The Reorganization Committee of the Central of Georgia have secured control of the majority of the bonds of this company and of the Augusta & Knoxville road, which it operates, thus making unlikely any opposition to the purchase of the property by that committee. The main line extends from Augusta north to Spartanburg, N. C., 135 miles, with two other branches to Anderson and Greenville, aggregating 96 miles.

Union Pacific.—The new plan for the reorganization of the Union Pacific was published last week. It is now just two years since the property was put into the hands of receivers and about nine months since the first formal scheme for its reconstruction failed after the defeat of the Reilly bill in the last few days of the late Congress. This bill, it will be remembered, offered the Government a very sensible settlement of its claim by an extension of its mortgage at a more reasonable rate of interest. The offer was rejected by the House with a burst of righteous indignation, and nothing was left for the Reorganization Committee but to disband. After a year's effort the whole matter turned out an ignominious failure. The present plan is more promising as it goes to the bottom of the matter. It aims to create a funded debt whose fixed charges shall fall inside the lowest figure which net earnings have reached in the worst year of depression. For good years the net earnings of the road have been about \$8,000,000. The average of the last 10 years, good and bad, is \$7,563,669; the lowest point to which they have fallen is \$4,315,077, but the fixed charges under the new company will be only \$4,000,000. It is proposed that the securities of the company shall consist of a general first mortgage of \$100,000,000; preferred stock, \$75,000,000, and common stock, \$61,000,000. If earnings reach the average of recent years, these figures show that over and above the four per cent interest on the mortgage, there will be enough to pay a like amount on the preferred stock.

The holders of the present first mortgage are to receive an equal amount of the new first mortgage, and an additional bonus of 50 per cent. in new preferred stock. Even the Kansas Pacific consolidated mortgage bonds receive 80 per cent. new 4s and 50 per cent. preferred stock. Besides this a money syndicate of \$10,000,000, or if necessary \$15,000,000, has been formed to pay up the coupons which have been defaulted. These favorable results are attained at the expense of the Union Pacific stockholders who are called upon to pay in an assessment of \$15 a share, which provides cash for the immediate needs of the property.

Under the scheme proposed a very liberal compromise with the Government is possible. After the old first mortgage has been exchanged on the basis given above, and \$13,000,000 new 4s, and \$7,000,000 preferred stock are held back for equipment and reorganization purposes, there is still left \$35,755,280 of bonds and \$20,864,400 of stock which represents all that the plan can possibly offer the government in satisfaction of its debt.

The idea of the Government trying to operate the road itself is scouted by the Government directors in their report for this year. They propose that the Attorney-General shall proceed immediately to foreclose the Government lien, take the road and sell it to some committee which shall be ready to advance all that the Government is obliged to pay to settle the prior liens, together with the sum which Congress shall decide to be sufficient to be received in satisfaction of its own claim against the railroad. If such a scheme should be carried through, the present reorganization committee would be in a position to buy in the road and put it in shape, but their plan offers the possibility of an effective compromise by extension of the Government claim on very favorable terms, and it would be thus an expensive mistake to take the roundabout way out of the difficulty suggested by the Government directors. Under the committee's plan of reconstruction the Government would be saved all the expense of foreclosure and sale by a simple adjustment.

The reorganization committee is composed of Lou's Fitzgerald, President of the Mercantile Trust Co., of New York; Jacob H. Schiff, a banker of New York; T. Jefferson Coolidge, Jr., of Boston; Chauncey M. Depew, Marvin Huggitt and Oliver Ames 2d.

TRAFFIC.

Traffic Notes.

Wagner sleeping cars are now run between Atlanta and Charleston over the South Carolina & Georgia and the Georgia railroads.

It is announced in the newspapers that the Directors of the Lehigh Valley and of the Baltimore & Ohio have approved the articles of agreement of the new Joint Traffic Association.

A demurrage association has been formed at Atlanta, Ga., with Mr. W. W. Haskell as Manager. At Buffalo the Demurrage Association has placed bituminous coal and coke on the 72-hour basis.

The roads running west from St. Paul announce that for 60 days they will carry cattle and hogs to the farmers of Minnesota and North Dakota at half rates, the object being to encourage the enlargement of herds of animals so as to make profitable use of the surplus of grain and potatoes.

The street railroad companies of Philadelphia, having consolidated themselves into one large company, have decided to raise fares. For a ride over two or more lines where, heretofore, the conductor of the first line, on receiving a five-cent fare, gave a free transfer, the through fare will now be eight cents. Details of the new arrangement have not yet been given out.

The Western New York & Pennsylvania has run the past season 96 excursions, carrying over 35,000 passengers to Niagara Falls, the Thousand Islands, Chautauqua Lake and Portage Falls, not including the Sunday and Wednesday excursions to Chautauqua or the many local excursions run by the company. Over 18,000 passengers were delivered to the New York Central for Niagara Falls.

Chicago Traffic Matters.

CHICAGO, Ill., Oct. 23, 1895. The meeting of General Freight Agents of lines members of the Western Freight Association, called by direction of the executive officers, adjourned Oct. 18, after having given instructions that from Oct. 19 no cut rates shall be made in the Western Association territory. Rates on wire and nails and kindred articles, coke, lumber, blinds, doors, sash and mouldings were restored. After a protracted discussion, it was agreed to restore rates on hard coal on Nov. 11 from Chicago to Missouri River common points to not less than \$2 per ton, and to Sioux City to not less than \$2.50. The former normal rate on hard coal was \$3.20 per ton, but it was found in-

expedient to advance rates beyond \$2.50 at present, owing to contracts which had been made. From Nov. 4 all grain rates are to be restored to Association basis, it being understood that lines exporting via Gulf ports keep the Chairman advised as to rates made on such business. A general meeting of executive officers will be held at St. Louis, Oct. 29, at which a special committee of vice-presidents will report concerning articles for a new agreement to take the place of the agreement of the Western Trunk Lines' Committee which collapsed last spring. It is given out that no attempt will be made to revive the division-of-tonnage feature of the agreement, but that it will be an "upon honor" agreement. No attempt was made to take up the Colorado situation, this being without the jurisdiction of the Western Freight Association.

Pursuant to similar directions received from the executive officers, the General Passenger Agents of the Western lines are again at work endeavoring to agree upon articles for a new Association.

Lake rates are generally firm, with occasional fluctuations. The bulk of the business last week was taken on the basis of three cents a bushel on corn to Buffalo.

Beginning Oct. 20, the Louisville, New Albany & Chicago put on a train in connection with the Louisville & Nashville, the Nashville, Chattanooga & St. Louis and the Western & Atlantic, making the run from Chicago to Atlanta in 25 hours. The distance is 799 miles.

The Southwestern Traffic Association has decided to reduce lumber rates from Texas points to Western territory 15 cents per 100 lbs from the usual basis.

The shipments of eastbound freight, not including live stock from Chicago, by all the lines for the week ending Oct. 19, amounted to 86,023 tons against 88,398 tons during the preceding week, a decrease of 2,375 tons, and against 46,594 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO OCT. 19.		WEEK TO OCT. 12.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	7,375	8.6	6,831	7.6
Wabash.....	7,636	8.9	10,105	11.5
Lake Shore & Mich. South.	15,390	17.9	13,288	15.0
Pitts. Ft. Wayne & Chicago	9,327	10.9	11,445	13.0
Pitts. Cin., Chi. & St. Louis.	7,804	9.1	9,358	10.6
Baltimore & Ohio.....	5,593	6.5	5,974	6.8
Chicago & Grand Trunk.....	8,392	9.6	8,005	9.0
New York, Chic. & St. Louis	7,450	8.6	7,627	8.5
Chicago & Erie.....	11,735	13.7	11,149	12.7
C., C. & St. Louis.....	5,361	6.2	4,616	5.3
Total.....	86,023	100.0	88,398	100.0

Of the above shipments 1,971 tons were flour, 48,255 tons grain and mill stuff, 11,942 tons cured meats, 10,239 tons dressed beef, 1,574 tons butter, 1,455 tons hides, and 4,691 tons lumber. The three Vanderbilt lines carried 35.1 per cent.; the two Pennsylvania lines 20.0 per cent.

Southern States Freight Association.

The long pending negotiations between the roads in the Southern Railway & Steamship Association, looking to the reorganization of that association under an agreement which would not need to be renewed annually, have finally come to a satisfactory conclusion, and Col. H. S. Haines has been chosen Commissioner. Mr. J. W. Thomas, of the Nashville, Chattanooga & St. Louis, is President, and Mr. R. G. Erwin of the Plant system, is Vice-President. The Georgia Railroad and one or two others were very obstinate in their refusal to join the new association, but an agreement was reached on Oct. 18. Five roads seem to have declined so persistently that the organization has been completed without them. These are the South Carolina & Georgia, Port Royal & Augusta, Port Royal & Western Carolina, Florida Central & Peninsular and the Savannah, Americus & Montgomery. Under the new agreement a member may withdraw on 60 days' notice, and it is said that the penalty clause is practically abolished. The provisions for arbitration are said to be very liberal.

The Union Stock Yards Switching Charge Cases.

The Illinois Railroad Commissioners have handed down their decision on the complaint of James Brown, a stock dealer at Dwight, against the Chicago & Alton, which was heard last March, for alleged discrimination in charging \$2 switching charge on a car of hogs consigned to the Union Stock Yards, Chicago, as noted in these columns, March 15. This complaint was brought in the nature of a test case, after the Chicago lines had determined not to discontinue the switching charge on live stock. It is understood that Brown is backed by all the prominent commission firms at the yards and that the Alton will have the support of the other railroads in defending the case.

The defence of the Alton at the hearing was that the stock yards are not a station on its line; that it has proper facilities of its own for the delivery of live stock, but that shippers refuse to make use of them and demand delivery at the stock yards; that the charge of \$2 is not unreasonable in view of the tax imposed on the road by the Stock Yards Association and the expense involved in running trains to the yards.

The commission finds that the Alton had no other Chicago terminal capable of caring for its live stock shipments; that it was the universal practice to deliver live stock shipments at the stock yards; that it was actually a less mileage from Dwight to the stock yards than from Dwight to the Chicago terminal of the Alton, and that the added \$2 per car made a rate in excess of the maximum freight rate allowed in the state. The Alton proposes to ignore the ruling of the commission and let the interested parties bring suit if they so elect, and test the matter in the courts.

It will be remembered that the agitation regarding the \$2 switching charge was commenced last November, when a suit was brought against the Atchison in the United States Circuit Court at Chicago, before Judge Grosscup. The outcome of this suit was a decision in favor of the shippers and an order on the railroad to deliver stock at the yards without imposing the additional switching charge. An appeal was taken in this case to the United States Supreme Court, where it is now pending. The Atchison, however, being itself in the hands of the United States Court, was obliged to respect the ruling made at that time and promptly abolished the \$2 charge on live stock, but retained it on all other freight. Subsequently, the Chicago lines decided to continue the charge on live stock from all points not competitive with the Atchison in Illinois, and also on hogs and sheep from all points, but to discontinue it on live stock shipments from points in Illinois competitive with the Atchison. This arrangement has been, theoretically at least, in effect since last spring, and the Brown case was brought in consequence of the decision of other Chicago lines not to accept the ruling made in the Atchison case.